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An Address

ON

LYMPH-STASIS THE PRECURSOR OF CANCER*

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I PROPOSE to use my opportunity to-day for the purpose of laying before you my views on the origin and causation of cancer. Carry your minds back, then, to the dawn of the world, uncounted millions of years ago, when life first appeared upon its surface in the form of amoeba-like organisms, each a single cell, a single unit of living protoplasm, animated by two fierce passions—the desire for food and the desire to double its ego by the simple process of cell-division.

A little later in time there arose from these unicellular organisms, organisms composed of many cells living together in a communal life like that of a small village or a great city. The cells are now specialized into groups, and each kind of cell follows a trade or profession, exerting for the community its special skill, receiving from the community in exchange food, warmth, and protection. To carry out the scheme and to ensure that each cell receives its due share of food, and of such cell products as it no longer makes for itself, elaborate systems of conduits—the circulatory, lymphatic, and glandular systems—have been evolved, and equally elaborate machinery, comparable with the telegraphs, telephones, and newspaper and business offices of the city, brings information of the outer world, and controls the activities of the cell community.

As Sir Arthur Keith¹ has said: "The resemblance between the body physiological and the body politic is more than an analogy; it is a reality," and Mr. Morley Roberts² has insisted that politics must be regarded as a branch of the science of biology.

It is a part of the bargain that the individual cells shall abandon the primitive right to unlimited cell division. In the many-celled animals this right is reserved to the cells of the ovary and testis.

THE ORIGIN OF MANY-CELLED ORGANISMS

It is an interesting speculation how the many-celled organisms arose from the unicellular individuals, which were presumably the first living things to appear on the globe. It appears likely that they arose from some inhibition of the process of cell division when it had proceeded half way, that is to say, the nucleus completely divided, but the cell protoplasm still remained connected by protoplasmic strands. There is evidence that the cells of the higher animals are still interconnected by protoplasmic bridges. To understand the origin of multicellular organisms the most hopeful avenue is a study of the processes which inhibit or frustrate cell division after the process has been initiated. Such a study might be pursued upon the amoeba.

Note that, if the foregoing sketch of evolution is true, each cell of one of the higher animals is descended from a primitive one-

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celled organism with an irresistible appetite for food and for multiplication. Note, further, that these are the appetites which dominate the cancer cell, and you may be led to conclude that cancer is an atavistic reversion of certain cells of the body to the state of their primitive one-celled ancestors. Such a conclusion would, in my opinion, be correct. The cancer cell is a selfish unicellular organism, derived by direct descent from the cells of the body, but living among them as a parasite.

You might further be led to compare the cancer cell, with its fierce antisocial individualism, to an anarchist in the body politic, and to inquire whether the anarchist represents a spontaneous reversion to the savage primitive type of man, or whether he is the product of disorders in the social organism. Experience shows that the anarchist does not appear, or is soon exterminated, in prosperous and happy communities. It is therefore probable that in cancer the reversion to the primitive cell type is conditioned by disordered bodily function. In other words, the body has failed to carry out the contract under which the cell abandoned its right to unlimited multiplication. Under that contract each cell of the body has the right to its share of the products of all the other cells. It has also a right to protection from external irritation. It is my object now to show how the contract has been violated. My observations lead me to believe that the origin of cancer is intimately associated with local obstruction of the lymph vessels in the area where the cancer arises. To produce cancer the obstruction must be of long standing—must have lasted from twenty to thirty years. It may not be complete enough to cause obvious lymphatic œdema, but may manifest itself only by papillary hypertrophy and increased cellularity of the subepithelial connective tissues. Complete direct proof of this theory is at present impossible. But if the disconnected heap of jig-saw fragments which constitute our knowledge of cancer are tried together upon this hypothesis and are found to fit as a coherent picture, a definite orientation, hitherto lacking, will be given to experimental work on the origin of cancer. It is for the reader to judge if my work fulfills the object thus stated.

It is, I think, significant to note that the

recent work of Warburg shows that the cancer cell is a cell which has somehow acquired an entirely new type of cell metabolism, but no suggestion has hitherto been offered as to the way in which this change of cell habit is brought about. It is evident that chronic lymphatic obstruction must profoundly influence the conditions under which the cell lives. The intercellular pressure must be raised, wandering cells brought by the blood will be trapped in the district and will be unable to leave it, the supply of oxygen will be restricted, and the fluid bathing the cells will be relatively stagnant—wanting, therefore, in the supply of fresh hormones derived from other cells of the body, which it should normally contain, and wanting specially in the inhibitory hormone which is the sedative to the cell's primal passion for division.

We must now consider what light can be obtained upon the etiology of the disease from a study of experimentally produced cancer. The salient facts will be found well marshalled by P. Menetrier,³ who has himself done so much to advance this subject. He shows that attempts to induce cancer by the injection of micro-organisms, or by the inoculation of embryonic grafts, have failed. Doubt is thus thrown upon the infective theory of cancer, and upon Cohnheim's hypothesis of its origin in embryonic "rests." On the other hand, chronic irritation in various forms has succeeded in artificially inducing cancer; and Menetrier's belief that cancer is a morbid process resulting from "multiple and non-specific forms of irritation," is thus justified. The successful irritant may be:

1. A physical agent, such as x-rays, radium, or heat.
2. A chemical agent, such as tar or paraffin.
3. A parasitic agent, such as the spiroptera which causes stomach cancer in rats, and possibly the bilharzia (bladder cancer) and the demodex (Borrel).

It must be observed in passing that it does not take us far to say that chronic irritants produce cancer. We want to know whether their effect is a direct one on the epithelium, or is exerted indirectly through an action upon the connective tissue. If the latter, what is the nature of the connective tissue change?

To resume our study of Menetrier. By exposing the ears of guinea-pigs for long periods to repeated small doses of x-rays he produced

hyperplasia of the epithelium and metaplastic alterations of the cells. He draws attention to the great thickening of the epithelium, and to the formation in it of cell nests, also to "papillomatous appearances," which he evidently considers deceptive and due to the down-growth of epithelial processes, a mistake which Clunet also made. He does not refer to the changes in the connective tissue of the papillæ.

In concentrating his attention upon the epidemic changes and ignoring those in the connective tissue, I believe that Menetrier has missed the true interpretation of his results. In his figure (Fig. 9) there are to be seen hypertrophied papillæ, a stage of real, if incipient,

papillomatosis. In the centre of each of the two hypertrophied papillæ on the left are seen cellular cords, uniting below to form a single vessel. My experience with lupus (cf. Fig. 7) warrants me in asserting that these cords are papillary lymphatics of origin in a state of proliferative lymphangitis. In the papillæ to the right of the figure the process has gone further: the vessels have been destroyed and a richly cellular mass of granulation tissue has replaced them (cf. Fig. 8). In my view, then, the x-rays have set up an obliterative lymphangitis of which the epithelial hypertrophy is a secondary consequence. A direct stimulating action of the x-rays upon the epithelium may no doubt occur, but it is of less

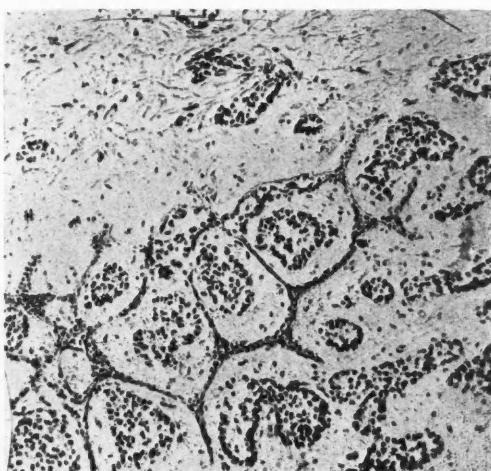


FIG. 1.—Cross-sections of skin papillæ in Paget's disease of the nipple, showing blocked central lymphatics.



FIG. 3.—An innocent duct papilloma of the breast. (Contrast Fig. 4).

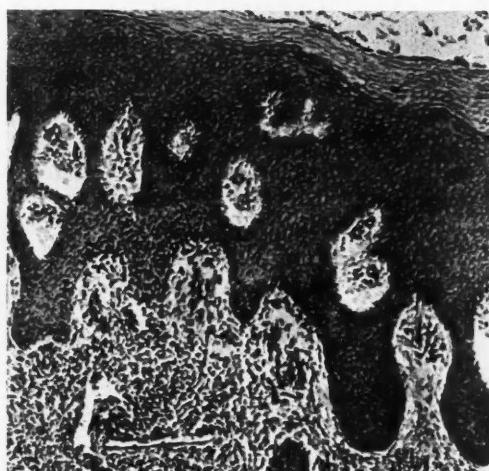


FIG. 2.—Cross-sections of skin papillæ in lupus, showing blocked central lymphatics. (Cf. Fig. 1).

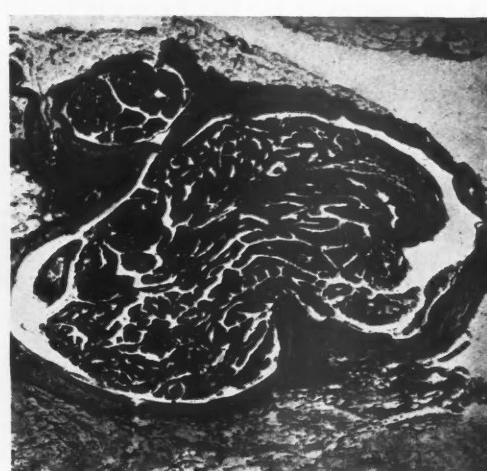


FIG. 4.—A duct papilloma of the breast which is already carcinomatous. (Contrast Fig. 3).

moment than the lymphangitis which Menetrier ignores, as will be seen when the facts of lupus carcinoma are studied.

Marie, Clunet, and Lapointe exposed a number of white rats to a few successive massive doses of x-rays, each dose causing a severe dermatitis. In two cases a spindle-celled sarcoma arose in the irradiated area, but epithelioma was not produced in any of the animals. These experiments, from my point of view, show the predominance of the connective-tissue changes produced by chronic radiation over the epithelial changes. Though in man the epithelial changes may ultimately prove of more serious import, they are

conditioned by previous long-standing chronic lymphangitis, and perhaps to a less extent by obliterative haemangeitis.

It may be remarked that papillomatous hyperplasia is a recognized precursive stage of x-ray cancer. Furthermore, early x-ray epitheliomata have a tendency to remain localized for a long time, and only disseminate when they have advanced by infiltration into regions where the lymphatics are still intact. In these respects they resemble lupus cancer, which is certainly conditioned by lymphatic obstruction.

In 1923 Block succeeded for the first time in producing an x-ray carcinoma in a rabbit.

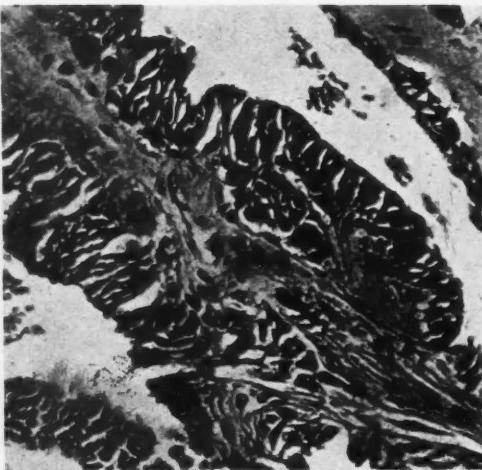


FIG. 5.—A highly magnified portion of the papilloma seen in Fig. 4, showing infiltration of its connective tissue by malignant epithelium.



FIG. 7.—Section just beyond the edge of an area of non-ulcerative lupus of the skin, showing the blocked papillary lymphatics which simulate a stag's antler in outline.

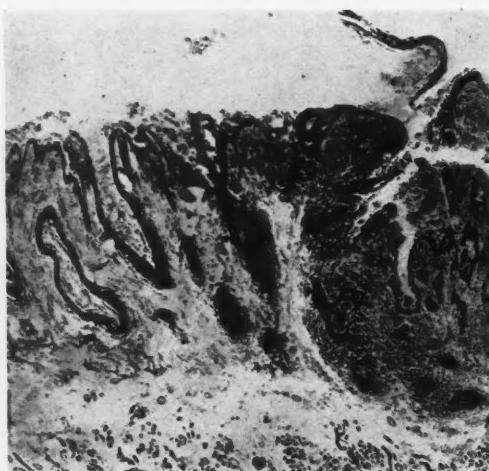


FIG. 6.—Hypertrophied papillæ adjacent to a carcinoma of the tongue. On the right the edge of the carcinoma is seen.

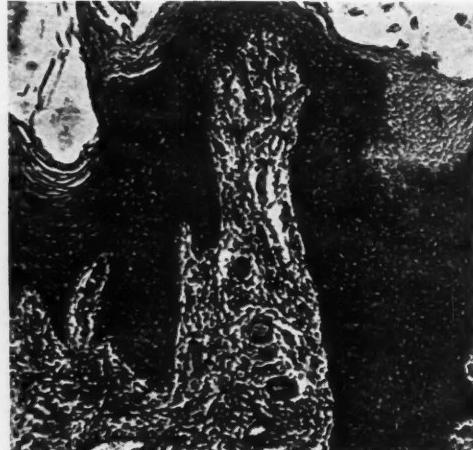


FIG. 8.—A much hypertrophied papilla of the skin in lupus occupied by tuberculous granulation tissue and by a line of giant cells representing the original central lymphatic.

TAR CANCER

The precancerous stage of clinical tar cancer manifests itself by the production of warts (Fig. 11), which mostly after a time drop off, leaving an erythematous or pigmented patch. Sooner or later one of the warts grows, becomes broad-based, ulcerates, and develops all the signs of malignancy (Fig. 12). Yamagiwa and Itchikawa, in 1914, first succeeded in producing experimental tar cancer by painting the ears of rabbits with coal-tar once every two or three days. Sometimes the applications were preceded by the intradermic injection of scarlet-red, an admirable means of irritating the lymphatic vessels. In

from 30 to 100 days papillomatous new formations appeared. In certain cases after 55 to 360 days carcinoma appeared. In a later series of experiments carcinoma was produced in 77 per cent of the experimental animals. In 72 per cent metastases occurred. The same authors injected tar into the mammary gland of female rats, and produced cancer of the mamma in 12 per cent of the animals. Yamagiwa and Itchikawa state that "repeated simple chemical and physical irritation renders the normal epithelial cell cancerous, without any necessity to invoke another unknown causal agent." This statement requires examination. It is at least possible that the tar



FIG. 9.—Epithelial hyperplasia and metaplasia in the ear of a rat following x-radiation. From Menetrier, *Le Cancer, Généralités*, p. 129.



FIG. 11.—Tar warts of the forearm. From a patient who had worked in hot tar for twenty years.



FIG. 10.—Lupus carcinoma of the left cheek. On the right cheek is seen an innocent papilloma.



FIG. 12.—The scrotum of the same patient, showing a tar carcinoma.

acts primarily upon the connective tissues, and we must now inquire into the evidence available upon this point. It is certain, at any rate, that the connective tissue is not indifferent to the irritation of tar, for in Fibiger and Bang's experience in tar-painting mice, out of 24 tar carcinomas 2 were accompanied by a tar sarcoma. Russell produced sarcomas by deep or subcutaneous injections of tar.

More direct evidence of the importance of the connective-tissue changes produced by tar



FIG. 13.—Portion of colon removed by operation from a case of multiple adenomata. Note the little round tumours scattered over the mucous membrane. (M.A. 5. (x ¼).) (Dukes.)

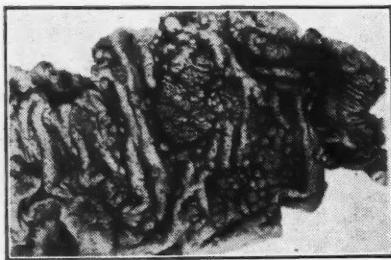


FIG. 13A.—To show the naked-eye appearance of the simple tumours associated with a cancer of the rectum. (Dukes.)

painting comes from Borrel. He noted the accumulation of connective-tissue cells (mastocytes) forming little intra-epidermic or sub-epidermic collections. Prolongations from these mastocytes insinuate themselves between the cells of the Malpighian layer, which is thus dissociated. The observations of Borrel harmonize with those of Victor Bonney,⁴ who in every case found that the origin of cancer is preceded by increased cellularity of the subjacent connective-tissue. Menetrier, without, I think, sufficient reason, ascribes these collections of connective-tissue cells rather to accidental infections of the skin than to the action of the tar. Nevertheless, Menetrier himself, in the epithelial hypertrophy

of the hair follicles, which is one of the pre-cursory stages of tar carcinoma, observed a great increase in the number of branched pigmented connective-tissue cells (chromatophores) lying among the deeper layers of the epithelium and in the superficial layer of the dermis. Evidently in such cases a powerful stimulus has been applied to the connective-tissue.

In the other precancerous stage of tar carcinoma, that of papillomatous hypertrophy, the deeper layer of the epithelium shows a hyperplasia of the chromatophores (pigment-bearing connective-tissue cells) which it normally contains. Later an increase of chromatophores is seen also in the underlying dermis.

It must, however, be admitted, as Menetrier insists, that in the rabbit's ear the onset of tar carcinoma may occur in the absence of any connective-tissue proliferation. It is true, as Menetrier says, that this fact runs contrary to the views of Ribbert as to the importance of inflammation of the connective-tissues in the origin of cancer, but, on the whole, the balance of evidence points strongly to the view that the action of tar is primarily upon the connective-tissue. I suggest that tar produces cancer by causing lymphatic obstruction with papillary hypertrophy as an intermediate stage in the process.

It has long been known that the evolution of a papilloma into a carcinoma is not a rare event, but the closeness of the relationship between these two forms of tumour has only very recently been realized. It seems probable that carcinoma is invariably preceded either by a definite papilloma or by a local area of papillary hypertrophy.

Chronic glossitis with papillary hypertrophy is the usual precursor of carcinoma of the tongue (Fig. 6). Cancer of the lip and of the larynx frequently arises on a pre-existing papilloma. In regard to carcinoma of the stomach there is no evidence.

Cuthbert Dukes⁵ has shown that in the neighbourhood of early carcinoma of the large bowel groups of papillomata can be usually demonstrated, though these disappear at a later stage (Fig. 13A). He infers that carcinoma of the bowel begins as a papilloma. Cases of multiple papillomata of the colon are known to end almost invariably in carcinoma, and generally before middle age is reached (Fig. 14). Dukes has

been able to demonstrate the origin of carcinoma at the tip of a papilloma (Fig. 15). On two occasions I have seen a papilloma appear at the lip of a colostomy opening as a little stalked, perfectly innocent, tumour, and develop within a few weeks into a carcinoma. On the first occasion, in a case of abdomino-perineal excision of the rectum for carcinoma, the new primary carcinoma grew rapidly and produced a malignant stricture of the colostomy opening. On the second occasion I excised the incipient carcinoma with scissors. It was the earliest and smallest carcinoma I have seen, and resembled Fig. 14.

MULTIPLE PAPILLOMA OF THE LARGE BOWEL

Jüngling⁶ has supplied a remarkable family tree covering four generations descended from a male who died of pulmonary tubercle and a female who died of old age. Both the ancestors were free of polyposis. Of their thirty-one descendants, fourteen suffered from polyposis

of the alimentary tract, five from cancer of the rectum. Two of the first generation died of intestinal tubercle. Four of the six children of the first generation died of carcinoma of the rectum. For further details the family tree must be consulted. It appears to justify Jüngling's assertion that the tendency to polyposis behaves as a Mendelian dominant.

Professor Jüngling makes no comment on the fact that this family had a tuberculous ancestor and that tubercle reappeared in the two succeeding generations. Yet it seems to me likely that this fact is the key to the unknown pathogenesis of intestinal polyposis. It is known that when tubercle attacks the skin it may cause either an ulcerative or a warty non-ulcerative form of lupus. I believe that when it attacks the mucosa of the intestine, and fails to produce ulceration, an intestinal polyposis is the result. And just as carcinoma may attack the scarred area of a lupus, so may it arise in an intestinal polyposis. Papilloma of the

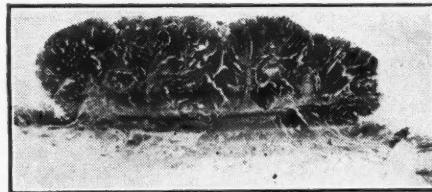


FIG. 14.—A complete section through a very early cancer of the rectum, which measured only 1 cm. in its broadest diameter and projected like a little button about 3 mm. above the surface of the bowel. Four small non-pedunculated adenomata were found within a radius of two inches of the growth. (M.A. 6.) (x 8.) (Dukes.)



FIG. 15A.—A higher magnification of the tip of the polypoid adenoma illustrated in Fig. 15, to show onset of cancer at tip. (x 135.)

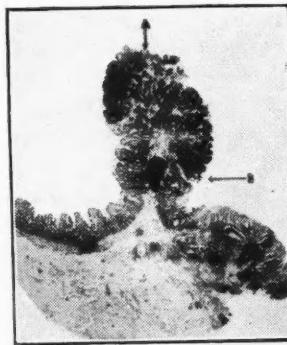


FIG. 15.—A polypoid adenoma situated close to a large ulcerating cancer of the rectum, but separated from it by an inch of normal mucous membrane. Other smaller adenomata were also present. The cells at the tip of this tumour had undergone cancerous degeneration (A) (see Fig. 15A); B, lymphoid follicle in stalk of tumour (dark mass). (M.A. 9.) (x 6.) (Dukes.)

bladder likewise, in my opinion, is a non-ulcerative form of tubercle of the bladder. A case in which I removed a typical polypus from near the right ureter, and had subsequently to remove the right kidney for what proved to be advanced tubercle, remains in my mind as a probable indicator of the pathogenesis of vesical polypus.

It might appear useless to bring forward these hypotheses upon such inadequate evidence. I do so in order to suggest that some young investigator who reads these lines should endeavour to produce intestinal and vesical polypus in animals by injecting the lymphatics

locally with a suspension of active tubercle bacilli.

CANCER OF THE BREAST

In the case of the breast the appearance which Lenthal Cheatle calls the "laciform edge" is a diffuse papillomatosis of the smaller ducts. He points to this appearance as a precursor of malignancy. If, as Cheatle maintains, and I think correctly, nearly every case of breast carcinoma originates in the ducts, it is probable that nearly every case of breast cancer is preceded by papillary hypertrophy or by definite papillomata.

Duct papilloma of the breast is recognized clinically when it arises in the larger ducts and causes serous or blood-stained discharge from the nipple. Such cases, if neglected, are known to end usually in carcinoma. In the following case I was able to demonstrate the occurrence of carcinomatous degeneration in a duct papilloma of the breast, which had apparently only existed for a very short time. At the time of the operation the papilloma was suffering from carcinoma, but the disease had not yet attacked the tissues of the patient herself.

Mrs. —, aged 70, noticed a serous discharge from the left nipple a week before she was first seen on June 12, 1928. The breast was normal on palpation except that vertically, half an inch below the left nipple, a tiny very superficial shot-like swelling could be felt. Pressure at this point made fluid exude from the nipple. No other nipple changes were found. There were no glands in the axilla. On June 15, 1928, this lump was cut down upon, two dilated ducts were exposed, divided close to the nipple surface, and then again divided where they began to ramify in the breast substance. On section of the excised portion across the ducts a small papilloma, just visible to the naked eye and perhaps one-fiftieth of an inch in diameter, was found within the duct, attached to it by a slender pedicle. A section across the tissue showed that this minute and early morphological papilloma had already become a carcinoma within its own substance. The fibrous tissue of its core was infiltrated with carcinoma cells, though there was no evidence that the physiological tissues of the patient had been attacked by the disease. The pedicle of the papilloma, fortunately included in the section, was composed of fibrous tissue only, and showed no infiltration. (Figs. 4 and 5).

An indication of the pathogenesis of the papilloma was, however, given upon examination of the pedicle. It showed several cylindrical groups of round-celled infiltration, some cut as circles, others as ovals. In company with one of the groups was a small artery. These are exactly the appearances given by blocked lymphatics which have lost their lumen by proliferation of their endothelium, as I know

from my experience of lupus and elephantiasis. In other words, the patient had suffered from a chronic lymphangitis of the tissues of the breast, and it appears highly probable that the resulting lymph-stasis was one of the main exciting causes of the papilloma which so rapidly developed into a potential carcinoma. It appears possible that the *Demodex folliculorum*, known by the work of Dr. Helen Chambers and others to be so common an inhabitant of the nipple and of the terminations of its ducts, is competent to excite mild infections and abrasions of the nipple, which, while causing no clinical symptoms, may nevertheless set up a chronic lymphangitis.

By this time you will, I think, admit that a process of papillary hypertrophy, sometimes only to be shown microscopically but often producing visible warts or papillomata, is the characteristic precursory stage of carcinoma. Chronic irritation, whether it be bacterial or chemical, would appear to be a cause of cancer, because it is a cause of papillary hypertrophy. If this be so, a study of the origin of a papilloma may be the key, and at least must be an essential preliminary to an understanding of the genesis of carcinoma.

THE PATHOGENESIS OF THE PAPILLOMA

If a single papilla of the skin or of a mucous membrane is examined it is found to consist of a tent-like elevation of the connective tissue, carrying in its substance a mesh-work of blood capillaries. These capillaries are supplied by an arteriole and drained by a venule. The papilla is clothed by a covering of epithelium, and it has always been presumed by the dermatologists that the active agent in the formation of a papilloma is increased proliferative activity on the part of the epithelium, and that the increase in size of the connective-tissue papilla is merely a response to increased nutritive demands from the active epithelium. Unna, on these grounds, objected to the word "papilloma," and wanted to substitute for it the word "acanthoma," as indicating an innocent tumour of the prickle epithelium. He ignored an essential anatomical element of the papilla which is the key to its normal and morbid physiology. The central structure of every papilla of the skin or the mucous membrane is a lymphatic capillary exactly like the lactal

vessel of a papilla of the small intestine. I have demonstrated this by direct lymphatic injections of the skin, as well as by a study of diseases affecting the skin lymphatics (Figs. 1 and 2). Papillary hypertrophy occurs, and I believe only occurs, when this central lymphatic vessel of the papilla is blocked. The papilla is a little physiological engine. From its blood capillaries there exudes into its connective-tissue spaces a constant nutritive stream of diluted blood plasma at a certain pressure. The excess of fluid is renewed and the equilibrium maintained by the drainage action of the central lymphatic. Block this lymphatic and what will happen? The first effect will be a rise in the pressure in the intercellular spaces of the papilla, and on ordinary hydraulic principles the papilla will increase in size until the intercellular pressure is equal to the pressure in the capillary blood vessels. A second effect will be over-nutrition and consequent proliferation of the papilla itself and of the overlying epithelium. But the most important effect of all for our present purpose remains to be considered. In the normal papilla a constant stream of blood fluid, along with lymphocytes, is exuding from the capillaries and passing away by the lymphatic. As soon as the lymphatic is blocked, stasis occurs and the flow of fresh blood fluid through the papilla is arrested or greatly retarded, even though just as much blood may be passing through its blood capillaries. Two consequences are inevitable: the supply of oxygen to the tissues of the papilla, to its epithelium as well as to its connective tissue, will be much reduced; furthermore, the supply of hormones to the cells of the papilla will be cut off or greatly diminished. In this connection I use the term "hormone," perhaps somewhat loosely, to signify those products of the rest of the cells of the body which are necessary to the well-being of the cells of the papilla we are considering. Here, I think, we approach the crux of the problem. Local lymphatic stasis brings about a definite rupture of the contract in virtue of which the unicellular organism originally forswore its egotism and became a social unit. Or, in the terms of biochemistry, the epithelium covering the papilla is deprived of the supply of growth-inhibiting substance, which in a well-conducted cell community is circulated to every cell.

I have shown that local lymphatic obstruction must seriously reduce the supply of oxygen to the epithelium of the blocked papilla. It would not be surprising if, in the course of years, the affected epithelium, adapting itself to meet this difficulty, should acquire a type of metabolism in which oxygenation played a relatively subordinate part. Warburg has recently brought forward strong evidence that the carcinoma cell, as compared with the normal epithelial cell, is an anaerobe, deriving most of its energy from the hydrolysis of sugar into lactic acid, and relatively little from oxidation. This remarkable fact is in exact accord with the theory of the origin of cancer which I am presenting to you. It must not be forgotten that in dealing with such a complex matter as the origin of cancer, direct proof is, in the earlier stages, not to be expected. All that can be hoped is to fit together the isolated facts into a coherent pattern.

In only one variety of cancer can I present with absolute clearness to you all the stages from the initial obstruction to fully developed carcinoma, a cycle of changes occupying in the human subject from twenty to thirty years. Tuberculous lupus, especially of the non-ulcerative variety known as lupus erythematosus, is followed, in a certain proportion of cases, by the appearance of warts upon the scarred surface, and one or more of these warts may develop into carcinoma (Fig. 10). Lupus carcinoma has been stated to be an x-ray carcinoma, and it may have become more frequent since the discovery of x-rays, but it was quite common before x-rays were known, and it is a natural evolution of the disease process known as lupus. By the examination of sections at and just outside the growing edge of areas of non-ulcerative lupus, I have been able to show that the disease is essentially an obliterative tuberculous lymphangitis which destroys the lymphatics (Figs. 7 and 8). The characteristic lupus nodules found in the derma are produced by proliferation of the endothelium of the affected lymphatics. The earliest stage of the lymphangitis is seen in apparently normal skin outside the visible edge of the diseased area (Fig. 7), and here also papillary hypertrophy of the diseased papille can be seen. Passing back to the centre of the area of lupus, progressive enlargement of the papillæ up to five times their normal

length can be seen. Here, then, it is evident that blocking of the lymphatic is the primary factor, with chronic papillary hypertrophy as its consequence. The further development of the papillary areas into carcinoma is a matter of common clinical knowledge. If tubercle affecting the skin may cause papillary hypertrophy, may produce definite papillomata, and may ultimately give rise to cancer, it would seem likely that tubercle in other parts of the body may have the same result. It is perhaps significant that the form of lupus which most commonly produces cancer is the non-ulcerative or papillary form in which there is lymphatic obstruction without ulceration or destruction of tissue. This fact lends colour to my suggestion that multiple papillomatosis of the large intestine, and also papillomata of the bladder, are really products of abortive local tuberculous infection occurring in early life.

In this connection I would draw your attention to some very interesting observations by Dr. Thomas Cherry⁷ of Melbourne. He ascertained statistically that whereas during the last thirty years the death rate from tuberculosis has greatly diminished and that from cancer has greatly increased, the combined death rate from tubercle and cancer together has remained at a constant level. This curious fact, though susceptible of several interpretations, in his opinion indicates that persons who recover from an attack of tubercle are likely in later life, and as a consequence of their attack of tubercle, to die of cancer. Since every tuberculous infection is of the nature of a chronic lymphangitis, and must leave behind it some degree of lymphatic obstruction, Dr. Cherry's facts, derived from the whole mortality experience of England over a long series of years, offer rather a startling suggestion of the importance of tubercle, and hence of lymphatic obstruction, in the etiology of cancer. Early this year Dr. Cherry published in the *Medical Journal of Australia* a paper in which he records that, by the subcuticular injection of active tubercle bacilli in mice, he has been able to raise the incidence of malignant tumours in the mice experimented on to a significant extent. These experiments call for repetition and confirmation. It is certain that under modern conditions an abortive attack of tubercle is a common event of early life. The frequency of healed scars at the pulmonary apices and of

tuberculous tonsils and adenoids suffices to prove this. May not mild, undetected tuberculous infection of the mammary glands in childhood leave behind them areas of lymph-stasis which give rise in middle life to duct papillomata and carcinoma of the breast?

Where I would differ from Dr. Cherry is in denying to the tubercle bacillus any specific rôle in the production of cancer. In my opinion any pathological process which gives rise to lymphatic obstruction may be a cause of cancer. The specific factor is not the particular organism concerned, but the lymphatic obstruction to which that organism may give rise.

The tubercle bacillus is not the only organism which finds itself at home in the sluggish stream and quiet backwaters of the lymphatic vessels. The history of syphilis is mainly a study in the pathology of chronic lymphangitis. The primary lesion is a local proliferative lymphangitis. There follows enlargement of the regional lymph glands, and then an invasion of the great fascial lymphatic plexus with an accompanying secondary rash, often presenting papillary lesions. The mucous membrane where it joins the skin is next invaded, and here lymphatic obstruction is clearly evidenced by the appearance of condylomata, mucous patches, and moist papillomata of the tongue and lips. Then, in the tertiary stage, the deeper lymphatics are invaded, and gummatous, which are areas of local proliferative lymphangitis, make their appearance (Fig. 16). The chronic glossitis which syphilis leaves behind it is an obstructive lymphangitis, known frequently to lead to papillary hypertrophy and carcinoma. Carcinoma of the lip and of the inside of the cheek frequently arises on the scar of an old mucous tubercle.

Chronic lymphangitis is not exclusively caused by the organisms of tubercle and syphilis. It may be due to many other organisms—for instance, to the members of the pyogenic group—and these organisms, also, in so far as they may produce lymphatic obstruction, are potential cancer-producing agents. Chronic lymphangitis may also be set up by a chemical or thermal agency. I have already given *prima facie* reasons for thinking that tar cancer, and the kangri cancer of Kashmir, and the epithelioma which occurs on the scars of old burns, are caused in this way. The fact that spontaneous tar cancer in man is usually preceded for years

by the appearance of crops of warts which drop off, leaving a pigmented area, is presumptive evidence of the co-existence of a chronic lymphangitis, and the initial lesion of the tar carcinoma of mice is usually a papilloma.



FIG. 16.—Gummatus elephantiasis of the right leg. From a case seen with the late Dr. J. J. Pringle.

Papillary hypertrophy as a consequence of pure lymphatic obstruction, apart from local infection, is perhaps best seen in elephantiasis. I have also produced it experimentally in the ear of the rabbit by placing an elastic ligature, not so tightly as to strangulate the blood vessels, round the base of the ear. Warts not rarely occur upon prolapsed rectal mucosa, and may become malignant (Fig. 17).



FIG. 17.—Prolapse of rectum with polypi.

Is there any connection between elephantiasis and carcinoma? If my contentions are correct, there ought to be. Well, I would point out that the chronic ulcers of the legs so often seen in elephantiasis may become malignant. A more striking example of the connection is within my experience. A lady who had lived in India for many years came home with typical elephantiasis of one leg. She was persuaded by a friend's advice to try radiant heat baths for the leg, and

shortly afterwards virulent multiple epitheliomata, twenty or thirty in number, appeared on the skin of the affected leg. The regional glands became enlarged and she died in a few months. In this case, judging by the multiplicity and activity of the growths, the cancerogenous factors were very active. The diseased leg differed from the healthy one in two obvious respects; it was the seat of long-standing lymphatic obstruction, and its surface when in this condition had been subjected to irritation by heat and light.

In this address I have dealt with a great subject, my remarks contain a large element of speculation, though for the sake of brevity and emphasis I have put them in dogmatic form. I shall be content if you admit my proofs that lymph-stasis lies at the root of cancer—certainly of carcinoma, probably of sarcoma. For the rest, my address is a working hypothesis, which may perhaps serve to orientate the work of younger men.

The anatomist, the physiologist, and the biochemist, and I would add the physician, have devoted too little attention to the lymphatic system. The biologist has never attempted to produce from a unicellular organism a bicellular one, still less a multicellular one. There exists, I believe, a four-celled organism, two of whose cells only possess mouths. Here in embryo is the multicellular animal. I challenge the biologists to produce experimentally a two- or four-celled organism from a unicellular one. When this has been accomplished, the converse problem, that of the origin of cancer, may prove easy of solution.

In conclusion, I do not want a tombstone, but neither am I content to lie under the green turf of oblivion. I would like to be remembered for two things; first, as having shown twenty-five years ago that cancer spreads mainly by lymphatic permeation; and, secondly, as having demonstrated to-day the importance of lymphstasis in its etiology.

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An Address

ON

**THE CLASSIFICATION OF OPERATIVE RISKS IN RESPECT OF THE OPERATION
OF THORACOPLASTY FOR PULMONARY TUBERCULOSIS,
AND THE RESULTS OF THAT OPERATION***

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THE subject that I have to speak on to-night is chiefly concerned with the classification of those patients suffering from pulmonary tuberculosis who are candidates for thoracoplasty, in respect of the risk involved and the results that may be expected.

I need not here discuss theoretical considerations, for the subject in its broad outlines is now fairly well understood. My purpose is rather to submit to you the results of a personal experience, based upon the analysis of 168 cases, in order to convince the unbeliever, if there still be such, that surgical treatment in certain forms of pulmonary tuberculosis may well be accepted on its merits. One must be careful to say "certain forms," because there is a danger that the very simplicity of the operative technique may lead the unthinking surgeon into the path of disaster. No other thing is so important as to realize that the essential difficulty lies in the judicious selection of the case, that is, in the operative indications.

As regards technique I will say no more than that the usual operation, as you know, is what is called extrapleural thoracoplasty, and that this consists in the resection, outside the pleura and subperiosteally, of eleven ribs, a resection which is done at the vertebral ends over a distance varying from one to six or seven inches, and in two or even three stages. In regard to the anaesthetic to be employed, my own choice has throughout been the combination of gas and oxygen, with novocaine for the skin and the intercostal nerves.

The minor operations of apicectomy, phrenic-

tomy, and pneumolysis will not here be discussed.

Surgical intervention is to be considered in three main types of lesion. Of these the most frequent is represented by the ordinary, uncomplicated, parenchymatous tuberculosis of one lung, showing a strong tendency to fibrosis. The second indication is found in certain complications of artificial pneumothorax, and the third in tuberculosis complicated by empyema. Before proceeding to discuss these three classes, may I be allowed a few words of a general nature?

In the first place, while it has been a general rule that the disease must be strictly unilateral, such ideal conditions are only rarely to be found. Nearly all cases show some disease on the good side. It should be remembered that practically all the patients who ultimately are referred to the surgeon are far advanced, according to the classification of the National Tuberculosis Association: they are patients in whom medical treatment, including pneumothorax, has reached the limit of its efficacy. In such, when one revises the history carefully, and when there is available for study a series of photographs, it is very frequently found that the disease at onset was bilateral, but that on one side that disease has been largely cleared away, or at any rate brought to long quiescence, while the other side has proceeded to fibrosis and cavity formation. So that, for the purpose of establishing the indications for thoracoplasty, it is not so much a question of knowing if one lung is diseased and the other comparatively free, but rather, being face to face with one markedly diseased lung and the other lung much less diseased, of estimating the resistance

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which those lesser lesions of the better side are able to oppose to the stress of operation. The problem is much more biological than anatomical, and our chief concern should be to establish an exact accounting of the patient's general resistance.

As a rule, resistance is shown by the degree of fibrosis, for fibrosis itself is Nature's method of healing. Therefore, we look for the evidence of this fibrosis through a study of the patient's previous history, through a careful physical examination, and, above all, through the help of roentgenograms, if possible a series of such. In the roentgenogram the signs of fibrosis are seen in that property which belongs to all scar formation, the property of contraction. We look, therefore, for a displacement towards the side of the lesion of the trachea, the mediastinum and the heart; of the ribs, which take on a more vertical position; and of the diaphragm, which is pulled up. In this study the help of the qualified internist and especially of the tuberculosis expert, particularly if there has been opportunity for prolonged observation, is invaluable. Are suspected lesions of the good side progressive? Are they showing signs of activity? In what direction is the clinical course tending? What will happen in the course of the next year or two if no operation is done? These and similar questions are best answered by the medical man, and the answer is extremely important. It is obvious, however, that there are degrees of safety and of danger, and I have recently decided to adopt the classification of Brunner, Sauerbruch's pupil, according to which the patients are put in three categories; the favourable, the doubtful, and the unfavourable. And you will see that the prognosis of operation varies so much as to justify such a classification. I must, therefore, first define these three classes.

FAVOURABLE CASES

Here we have to deal, pathologically, with chronic fibroid tuberculosis, predominantly unilateral, usually with cavitation, although the cavities should not be larger than a pigeon's egg, and without any sign of activity in the good lung. From the clinical point of view the disease has practically always been present for two years or more. The patient is an adult, in good general condition. His temperature and

pulse have long been normal or nearly so, but his sputum is positive. Artificial pneumothorax has been tried and found impossible, or has been judged inadvisable. Sanatorium care is recognized as having come to the limit of its usefulness. On the other hand, the patient can not resume active life, because regular work would probably provoke a relapse; nor should he resume community life because his sputum is positive. Moreover, his outlook is ultimately not good. The follow-up statistics of sanatoria demonstrate that even these "good chronics," with cavitation, tend strongly to gradual deterioration within the lapse of a few years, and that a considerable proportion die from the progress of their disease. It should not be forgotten that even these good cases are classed by the National Tuberculosis Association as "far advanced," and the patients frequently know this, and themselves ask if nothing more can be done. Fortunately, operation is extremely promising and can be recommended. The roentgenogram shows disseminated lesions in one lung, or lesions confined to the upper third, and, what is especially important, shows a contracted lung with pulling up of the diaphragm and pulling across of the trachea, mediastinum and heart towards the affected side, all this representing Nature's more or less successful efforts at healing through scar formation. The other lung is rarely clear, but eventual lesions in it are minimal and fibrotic.

THE DOUBTFUL CASES

Here the picture is somewhat clouded by unwelcome particulars. There is more extensive infiltration of the worse lung; the cavities are multiple or large, and show a tendency to progression. Frequently, the good lung is under suspicion, the lesions in it are not certainly thoroughly arrested, or may have been active six months or a year before. Clinically, the general condition of these patients is not of the best. They are subject to periods of slight rise of temperature and pulse; they have lost a little weight and strength; they do not feel quite well and have lost appetite. The sputum is markedly positive. If a series of x-ray films for the previous year or two is available, one is apt to find a slow but steady enlargement of cavities, and occasionally a small flare-up, with fresh seeding, which has been imperfectly

reabsorbed, although for months before apparently quiescent. There are present, nevertheless, the evidences of reasonably good resistance in the way of scar contraction of the worse side, without which, of course, one would not operate.

The prognosis of these patients, without operation, is certainly bad, although not immediately so. They are obviously slipping.

THE UNFAVOURABLE CASES

In this class, which may be called that of the bad chronics, the lesion is definitely progressive. If still confined to one side, cavitation is unduly extensive, and often occupies both lobes. But more frequently the cause of anxiety lies in the supposedly good lung, where one sees more recent tuberculous infiltrations, which have very probably been active during the preceding months, although at the moment and for some time previously they have been quiescent. It is hardly necessary to say that, if they are definitely active at the time of examination, no operation should be considered. These patients have ordinarily been running some fever for months. They have lost a good deal of weight and of strength, they eat little, do not sleep well, and exhibit the general appearance of suffering from a mild chronic toxæmia, which is far from reassuring to the experienced eye. The roentgenogram shows more extensive lesions, of which a part may well be suspected as representing recent invasions. The lesions look "soft," to use the roentgenologist's phrase, and are also found, though limited, on the good side. It is impossible to say that these last are definitely active and progressive, but one has a strong suspicion that upon any strain, as from exercise or from operation, they would be very apt to progress more or less rapidly. It is clear that resistance is failing.

THE RESULTS OF THORACOPLASTY

Having now defined these three classes, I may proceed to analyse the results of thoracoplasty from this point of view. But here again it is necessary to define the terms adopted in this classification of results. There is first the class of those who are *practically cured*, and here I accept the earlier definition of Sauerbruch. A patient is "practically cured"

when he no longer shows the clinical symptoms of tuberculosis, as judged after the lapse of one year or more following the operation; in particular, when he has lost all cough and sputum, or almost all; and when sputum, if still present, is mucoid, non-purulent, and has been found free of bacilli upon repeated examinations; when he has gained weight, feels well, and is able to perform a reasonable day's work,—in short, when he is able to earn his living and is no longer a danger to his fellows.

A second class is constituted by those who are *greatly improved*. They have but very little cough or sputum; they have no fever, and are able to do light work, perhaps not more than for two or three hours in a day; the sputum is consistently negative. Many of these later go on to a practical cure, while some slip back.

The term *moderately improved* applies to those, who, although still having cough and sputum, and not infrequently a positive sputum, have nevertheless lost all fever, feel stronger and better in every way, but are still obliged to take the cure. Their prognosis depends essentially upon the determination of the class to which they belonged before operation. Thus, for example, a "favourable" case, adjudged some time after operation as improved, will tend to move up with the lapse of time into the class of practical cures; while a patient of the "unfavourable" class, who has attained an amelioration for some time following the operation, may very likely lose this good effect, and go progressively downwards. Consequently, it should be understood that the figures that one sets down under these categories are relative only.

Below this class of improved, I think it worth while to set up another group, constituted by those whom the operation has left either *stationary* or *worse*. It is, in fact, important to make an effort before operation to recognize those for whom operation is unable to promise even such consolation as may be afforded by a strictly temporary improvement. Fortunately, as you will see from the tables, the numbers in this group are small.

And now as to the final class; that of the *deaths following operation*. These, I think, should be divided into the two subclasses of those *ascrivable* and those *not ascribable to the opera-*

tion. This is the simplest and fairest way of estimating the risks of operation, which is what the prospective patient, and indeed his physician, most wants to know. It does not matter whether death occurs the day after operation from cardiac failure, or four months after operation from acute invasion of the opposite lung directly consequent upon the operation: both are due to the operative act. On the other hand a death from typhoid, contracted during hospital stay, in an otherwise promising case, should not be ascribed to the operation. To me it seems both inaccurate and misleading to divide, as do some, the operative from the non-operative deaths by a period of time, arbitrarily set. Some place the limit for operative deaths at four weeks; some two months; some the hospital stay, whatever that may be; and some, going to the other extreme, set the limit at one year. I do not think that such classifications give us the information that we really want.

I may now proceed to give in detail the results

obtained by thoracoplasty in these three types of patients.

TABLE I.

GENERAL STATISTICS OF CASES OPERATED ON

	Number of Cases
Partial or Total Thoracoplasty for uncomplicated Cases.....	119
Partial or Total Thoracoplasty for Cases complicated by Empyæma.....	25
Thoracotomy Alone for Drainage in Cases of Empyæma.....	5
Thoracotomy to cut Adhesions in Cases of Sub-total Artificial Pneumothorax.....	5
Phrenicectomy Alone employed solely for very grave Cases.....	13
	<hr/>
	167

Favourable Cases.—Of these I have operated on 30, but only 24 date from more than a year ago. Of the 24, 16 are *practically cured* (66.6 per cent); four are *greatly improved*; 1, *moderately improved*; and 3 *died*. Of the three deaths, one occurred from typhoid in the eighth week after operation, having previously done exceptionally well; another died, three months

TABLE II.

THORACOPLASTIES PERFORMED OVER ONE YEAR AGO (EXCLUSIVE OF CASES OF MIXED INFECTION EMPYÆMA)

	Cases	Practical Cures	Greatly Improved	Moderately Improved	Stationary or Worse	Deaths Due to Operation	Deaths Not Due to Operation
I.							
CLASS A. Good Chronics	24	16	4	1	-	1	1 (typhoid and late progression of T.B.)
CLASS B. Doubtful Cases	45	17	8	9	2	3	6 (one of intercurrent disease after 7 years of practical cure.)
CLASS C. Bad Cases	21	0	3	4	-	8	6
II.							
A. With Partial Incomplete Pneumothorax	9	4	2	1	-	-	2
B. With Total Pneumothorax, but with Bands overlying Cavities	2	1	-	-	1	-	-
III.							
EMPYÆMATA.							
A. Chronic Seropurulent Effusion containing Tubercle Bacilli	6	2	2	1	-	-	1 (of intercurrent disease after 6½ years of practical cure.)
B. Thick Purulent Effusion containing Tubercle Bacilli	7	2	1	3	1	-	-
Total	114	42	20	19	4	13	16

after operation, of a tuberculous bronchopneumonia on the good side; and the third died three years after operation, of cause unknown, after having had the advantage of a period of moderate improvement. In this class, therefore, it is seen that the percentage of deaths ascribable to operation comes only to 3.3 per cent (1 out of 30), while the *cured* and *greatly improved* cases amount to approximately 83 per cent, and the majority of these are practically cured.

Doubtful Cases.—The patients of this class, operated on over a year ago, number 45, and 5 during the past year. Of the 45, 17 are practically cured (that is 38 per cent), 8 were greatly improved; none moderately improved; 2 were made worse, and 9 died. Of the deaths, 3 were due to the operation (6.6 per cent)—two days, six days, and seven weeks after the operation. In 6 cases death was not due to the operation, 5 dying of progressing tuberculosis, at intervals varying from one to five years after operation, while the sixth patient, having been classed as practically cured during the seven years following operation, finally died of some unknown cause, probably not tuberculosis.

Unfavourable Cases.—There were 21 patients belonging to this class and operated on over a year ago. Not one achieved a practical cure. Only 3 were greatly improved, 4 moderately improved, and 14 died. Of these 14 deaths, 8 must be ascribed to the operation (38 per cent). The other 6 died from the progress of their disease, after varying intervals.

It may reasonably be asked why operation is attempted at all in this last class, considering the poverty of results. The reason is simply that it is often difficult to estimate exactly the resistance of a given individual, and that although one may be inclined to put such a patient into this unfavourable class before operation, there remains frequently considerable doubt. One is then inclined to give the patient the benefit of the doubt, for even if the results of operation may be far from satisfactory, the outlook for such a patient under continued medical treatment is certainly desperate. It is always to be understood, however, that in the presence of definite active lesions in the good lung, in a patient whose resistance is clearly poor, it should be the rule not to operate. I am conscious of the fact that in the past I have at times allowed myself to be persuaded against my

better judgment into doing a thoracoplasty in patients of this type. And though a few of these have received more than enough benefit from the operation to justify its performance, the majority have only had to deplore the results of an ill-advised procedure. This is certainly one of the most difficult parts of the whole subject—the judging of the dubious risk. In these unfavourable cases, according to these results, we have to face a mortality of 38 per cent of operative deaths, and 28 per cent of non-operative deaths. There is left only the prospect of 33 per cent of improvements, without one practical cure.

While for humanitarian reasons it will continue to be difficult to refuse operation to these "poor risk" patients, recent experience encourages the hope that the high operation mortality can be materially reduced by doing the operation in three or four stages, rather than in the usual two stages.

PULMONARY TUBERCULOSIS COMPLICATED BY PNEUMOTHORAX

When the physician has established an artificial pneumothorax, he may feel it necessary to call in a surgeon under two sets of circumstances: the pneumothorax may be a partial one, leaving usually the adherent apex containing a cavity, uncomressed; or the pneumothorax may be almost total, but is restrained in its good effect by band adhesions running from lung to parietal pleura.

A partial pneumothorax is usually an unsatisfactory one, for the area of lung left uncomressed is the apex, in which are situated the most advanced lesions. The pneumothorax may have brought about at first a real improvement, but in many cases it ultimately becomes evident, through signs of progression, or, short of that, by an unsatisfactory stationary condition, that nothing more is to be hoped from a continuance of the pneumothorax. Under such circumstances it is indicated, in my opinion, to substitute a thoracoplasty, in order to bring about the necessary compression of the apex. Here one may either do an upper thoracoplasty on the first seven or eight ribs, if the lower lobe was previously sound, leaving a partial pneumothorax over the lower lobe; or, if the lower lobe was involved, one may abandon the pneumothorax and do a total thoracoplasty.

The suitable time for intervention depends upon the lesions which existed before the establishment of the pneumothorax. If these were acute and exudative, I think it wise to continue the pneumothorax for at least six to twelve months. If, on the contrary, the disease was from the first chronic, productive and ulcerative, I consider it useless to wait for any long time, for the reason that the lung, which is already sclerosed and contracted, will only with difficulty, at any ultimate date at which it is decided to abandon pneumothorax, be able to carry out its necessary expansion and fill again the thoracic cavity.

I have operated on 9 cases of this type. Four partial thoracoplasties yielded 2 practical cures and 2 deaths not due to operation, but to progress of the disease. Five total thoracoplasties gave 2 practical cures, 2 great improvements, and 1 moderate improvement. So that altogether we have 44 per cent of practical cures, no deaths from operation, and 22 per cent of ultimate deaths not due to operation. I cannot but feel, although the series is small, that these results constitute a fair argument in favour of giving up an insufficient pneumothorax and substituting a thoracoplasty.

With regard to the second group of total pneumothorax restrained by band adhesions, I do not propose in this place to say much. But I would like to make one point. In many of these cases the roentgenogram shows a cavity immediately underlying the insertion of the adhesion, which has the particular effect of holding that cavity open. Not only can such a cavity not heal, but also there exists a definite danger of its rupturing during cough. Often the cavity sends a prolongation into the base of the adhesion for a distance of one to five centimetres. It is of course easy, if the adhesion is favourably situated, to cut it, either with a cautery or after open thoracotomy; but it must be remembered that the risk of empyæma following this operation runs as high as 15 to 20 per cent. I have, therefore, come to the conclusion that it is often preferable to give up the pneumothorax and to do a total thoracoplasty, for the purpose of preventing all danger of empyæma, through obliteration of the pleural space. In this idea I have, during the past year and a half, done a total thoracoplasty in two patients, in whom band adhesions

overlay a large cavity and held it stretched. Both of these recovered well from the operation. One has gone on to a "practical cure," while the other did not do so well, as there occurred a bronchogenic spread, some months after operation, into the good lung.

In five other cases the chest was opened for the purpose of cutting band adhesions. Empyæma occurred in two. Of these one patient recovered perfectly, and for the last three years has been doing a full day's work under the condition of a total pneumothorax. The other, operated on two years ago, is still troubled with a discharging sinus from chronic empyæma, and there has occurred a fresh invasion in the good lung. This patient is slowly losing ground. One other patient of the five mentioned enjoyed perfect health, with a total pneumothorax after the adhesion was cut, for some four years, after which the lung was allowed to expand and the patient remains well. In two other cases, adhesions were found to be so extensive that it was impossible to do anything, and they were allowed to go on with their partial pneumothorax. One of these patients has since died.

TUBERCULOUS EMPYÆMA

For years past I have, for practical purposes, and from the surgical point of view, been accustomed to arrange the empyæmata occurring in the course of pulmonary tuberculosis, including those which complicate a pneumothorax, into three main groups.

In the first group the pleural effusion is seropurulent; in the second it is a thick, greenish fluid; and in the third it is a thick pus also, but of the nature of that resulting from a mixed infection.

Seropurulent Effusion.—Here the effusion is straw-coloured, but turbid, and usually contains tubercle bacilli, which, however, are often detectable only by the inoculation of a guinea-pig. It has occurred as the result of a simple tuberculous pleurisy, or following a spontaneous or artificial pneumothorax. In favourable cases it can disappear permanently after aspiration and a refill of air. The patient's general condition is often quite good. When after a number of aspirations in the course of six or more months the effusion obstinately recurs, and bacilli are demonstrable, I believe

that a thoracoplasty is indicated. The reason is that sooner or later such effusions tend to pass into the second class; that is, to change into the condition of a thick, greenish pus which is difficult to aspirate and which, besides containing tubercle bacilli, may show also a beginning invasion with pyogenic cocci. This is accompanied by a gradual change for the worse in the patient's general condition. A thoracoplasty, which obliterates the pleural space abolishes also the effusion, and prevents this change for the worse. It prevents also the occasional rapid transition into the third class, that of a serious mixed infection empyæma, due to a rupture of mural cavities. You are all acquainted with the extreme gravity of the mixed infection empyæmata, in which bacilli and cocci of all sorts are found in great numbers, and death is apt to occur within a few months from continued sepsis.

Of this first class I have operated on 6 cases, doing a total thoracoplasty. Of these, 2, after a period of two and one-half years and five years from the operation, are practically cured. A third was practically cured for seven years, when she died of an intercurrent illness; 2 are greatly improved three months and a year and a half after operation; and, finally, 1 is moderately improved twenty-one months after a partial operation, a wound infection having prevented the completion of the thoracoplasty.

Purulent Effusion.—Here the effusion is frankly purulent but the patient's general condition is often surprisingly good. It is sometimes difficult to discover tubercle bacilli in smears, but guinea-pig inoculation is nearly always positive. In a small proportion one can also find in smears a few pyogenic cocci. The patient is often afebrile until a large amount of pus collects in the chest, and then an aspiration and irrigation will ordinarily succeed in abolishing the fever for some weeks or even months, until a large fresh collection brings it on again. I have seen patients who had carried nearly half a chest full of such pus for as long as two years without serious effect upon their constitutional condition. But in the majority aspirations are necessary, fever becomes continuous, the pus thickens, and sooner or later the condition changes into the very grave mixed infection of the third class.

I have not hesitated, indeed I consider it

urgent, to operate upon patients of this second class in the hope of obliterating by a thoracoplasty, with simultaneous aspirations, the pleural space, and thus preventing the change into the dreaded mixed infection type. Some sort of operation, indeed, imposes itself in many cases because of gradual thickening of the pus and consequent difficulty, amounting at times to impossibility, of aspirating it, and by reason of the gradual aggravation of the constitutional symptoms; further, the apparent well-being is frequently purely relative. One is surprised upon discovery, at a first puncture, of a pus which looks so infective, to see the patient as well as he is. Nevertheless, as time goes on, bouts of fever recur oftener, anorexia appears, weight is lost, the pulse rate rises, and the patient looks worse.

Inasmuch as the empyæma in these patients occupies usually nearly the whole of one side of the chest, and as the pleura is thicker and more unyielding than in those of the first class, I have found it necessary to do a more complete thoracoplasty than is accomplished by the standard posterior paravertebral operation; so that, as a rule, I remove in three or four stages, at intervals of one to two weeks, the whole of the ribs from the transverse process to the cartilages. For the anterior halves I employ a long vertical axillary incision, curving forward at its lower extremity. Of this type I am able to report upon 7 patients operated on over a year ago; 2 have been given a practical cure, three years and three years and a half after operation; 1 is greatly improved, after two years and a half; 3 are moderately improved, one and a half to two and a half years after operation; and the 7th is growing progressively worse after two and a half years. I should add that in two of the patients there was present a bronchopleural fistula, which means a dangerous complication difficult to close. The one patient who is going down hill had such a fistula, and his empyæma has turned into the grave mixed infection type of the third class. Moreover, of 2 patients operated on during the past year, 1 has died, and he, too, had a bronchial fistula. The other is improved and promises well.

Results such as these must surely be regarded as encouraging. I assume, under correction, that practically every one of the

patients of this class is sure to die sooner or later. Once the empyema has progressed to this stage it is almost hopeless to bring about by repeated aspirations and irrigations a sterilization of the pleura, and a return to simple aseptic pneumothorax. If, then, one can restore two out of six to working life there is legitimate reason for satisfaction.

Mixed Infections.—The immediate cause of these mixed infection empyemata is a double one, in the sense that some represent a sort of culmination of one of the two preceding types, while others are immediately established in a healthy pleura through rupture of a cavity. The effusion contains numerous tubercle bacilli, staphylococci, streptococci, and sometimes anaerobes. The clinical appearance of the patient is well-known. He looks toxic, he loses weight rapidly, has high fever and rapid pulse. He often has an infected sinus in the chest wall at points where punctures have been made. There is usually present a bronchopleural fistula, which was the prime cause of his mixed infection and now leaves but little room for hope that the lung can ever expand. The evolution of the disease is almost certainly fatal within a period which varies with the severity of the infection. It is true that a few live a long time, even several years, especially if repeated aspirations or tube drainage succeed in reducing the fever. Nevertheless, even these ultimately die, while in the majority death occurs rapidly within the lapse of a few months.

This type offers to the surgeon a most difficult problem. One rule seems to be well-established; to wit, that one should avoid, if possible, opening the chest and putting in a drain; that one should begin with frequent aspirations. It is usual to add to this irrigations and the instillation of various antiseptics, of which the favourite ones have been formalin and glycerin, acriflavin, and gentian violet. The French recommend gomenol, of which I have no experience. Irrigations of large quantities of fluid are usually impossible on account of the bronchopleural fistula. My experience is naturally somewhat one-sided, inasmuch as most of the patients referred to me represent the failures of the methods described, which have already been tried by the physician. Nevertheless, I believe that the physician will admit the truth of the general statement that

these temporizing measures rarely succeed. If they do not succeed, and if after some weeks or months the patient is steadily losing, one is forced, in my opinion, to excise a rib and institute open drainage. In some cases, not many, this measure actually does fulfill its purpose. Fever disappears, and the patient is restored to the *status quo ante*, which may have been fairly good. The patient then remains with the pleural fistula, and, having overcome the gross infection, may live for years, though condemned to the drainage tube. After that his outlook depends largely upon the type and progression of his pulmonary disease, and the degree of his resistance. I dispose of an experience of fifteen cases of this class. In 12 of these a costectomy with drainage was the first surgical measure, of which 9 were done by myself and 3 had already been done when they entered the clinic. Of these 12, 8 cases had to be left without further operation, because their later course forbade it, and 7 of these went on to death, while 1, after two years, is going down hill. In the other 7 of the 15, I was able to do, in three or four stages, a total thoracoplasty. Such represent obviously a more favourable group, whose general resistance was so good as to encourage further work. It is clear that the proper proportion is not 7 out of 15, but 7 out of a much larger indeterminable number, who were not referred to me as being hopeless, either with or without drainage. However, in this small group of selected cases the results have not been too bad. Of the 7 there are two who are able to work a full day; 2 who are going about freely, able to work a little, but not needing to work; 1 with the cavity closed and greatly improved, but still under treatment 9 months after operation, and 2 who died in hospital. Two of those alive and comparatively well still have small cavities and have to wear a tube. Concerning the two able to work a full day, one to two years after operation, I have no information as to their being obliged to wear a tube. As to the five living cases it is certain that their condition, even when small cavity has persisted, is very much better than it was before operation, but it is impossible to regard them as permanently cured. If they had been operated on at an earlier stage of their empyema the results would probably have been much better, and

the same is true *a fortiori* of the eight patients who died, at least, of those who possessed original resistance. These patients come to the surgeon too late. Looking at things from the surgical point of view, and considering the very encouraging results of operation in the lighter types of tuberculous empyema, I point the moral, and would point it with all possible emphasis, that the physician should not delay sending to the surgeon his cases of tuberculous empyema, as here defined, until they have passed gradually or suddenly into this third stage of mixed infection. A relatively early tuberculous effusion, which, during a period of six months or more, persists in reaccumulating after several aspirations and air refills, should *ipso facto* be treated by an extrapleural thoracoplasty, which alone is able, by the fact of its creating a general pleural symphysis, to prevent the occurrence of the usually fatal mixed infection empyema. Should a subpleural cavity break outwards later, it will then pass between the ribs and appear on the chest wall as a relatively harmless cold abscess.

The ill reputation of the surgical treatment of pulmonary tuberculosis, which is entertained by many surgeons and by many more physicians, is due in large part, in their eyes, to the supposed fact that operation involves a high mortality percentage. That this is not the case is sufficiently proved by the figures which I have put before you this evening. In a total of 112 cases treated by thoracoplasty, dating over a year ago, and excluding only the grave mixed infection empyemata, we find an operative mortality of 11.6 per cent. A large proportion of these deaths occurred in patients who were definitely poor risks, and would have died in any case within no long period. This fact emphasizes the necessity of resorting to surgical interference at a much earlier date than heretofore. In the remainder one finds a non-operative mortality of 14.3 per cent, death occurring usually from progressive tuberculosis. Nevertheless, three of these died of causes other than tuberculosis, of whom two had lived six and seven years after operation

practically cured. It should be remembered that all patients chosen for operation are far advanced and have spent long years in medical treatment. The normal evolution of the disease in these patients offers a dark prognosis, and we may be certain that operation has saved and restored to community life a very gratifying proportion. The proportion of practical cures in the total number amounts to 37 per cent and that this practical cure is maintained can be seen from the appended table.

TABLE III.

DURATION OF CURE IN CASES OPERATED ON OVER ONE
YEAR AGO BY THORACOPLASTY EXCLUDING
MIXED-INFECTION EMPYEMATA

Year	Number of Cases	Number of Cures
1919-1920.....	6	3
1921	4	1
1922	9	3
1923	12	7
1924	14	6
1925	15	9
1926	24	10
1927	22	4
Total.....	106	43

It is also to be remembered that these patients without operation would have been condemned to sanatorium life for the rest of their days, and that if they did go home they would be unable to work and would be a danger to the community. The gain is obviously enormous.

May I, in concluding, make an earnest plea, particularly to the physicians who first see and treat these tuberculous patients, that they should realize it is their duty in the presence of every case of chronic unilateral tuberculosis to consider at an early stage at least the possibility of artificial pneumothorax and of thoracoplasty. Let them at least consult some surgeon who is known to have made a study of the subject (and surgeons with this knowledge are springing up all over the country), because the necessity of close collaboration between physician and surgeon is as imperative in this particular branch of our science as it is, for instance, in that of neurology; and the very remarkable advance which thoracic surgery has made during the past twenty years has been brought about very largely by reason of this close collaboration.

IMPORTANT FACTORS IN THE MANAGEMENT OF HYPERTHYROIDISM*

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FOR many years the treatment of hyperthyroidism varied greatly, but, during the past few years, particularly the past decade, the weight of opinion has been swinging strongly toward surgical treatment. Perhaps one reason for this change on the part of many practitioners is the gradual diminution in the danger of surgical treatment, such as the progressively decreasing incidence of severe complications, and the diminishing mortality rate, together with a decrease in post-operative morbidity. An added reason is, undoubtedly, the economic one of shortening the treatment and getting the individuals back to normal as soon as possible. This is particularly the case where the patient is the family bread winner.

Surgical treatment of this disease is admittedly unscientific and its limitations are freely recognized, but until a cause for the disease is discovered, or a more satisfactory form of treatment brought forth, we should concentrate our efforts in the direction of increasing the efficiency of the treatment at hand. With this purpose in view, my remarks will apply chiefly to surgical treatment, and may be considered under three headings: (1) complications; (2) mortality; (3) recurrence.

COMPLICATIONS

Complications following thyroideectomy may be very serious, and the best means to prevent them is to appreciate their danger and develop an operative technique that will reduce their incidence to a minimum. A complication is always more serious in very sick people; for instance, haemorrhage during or a few hours after operation may not be sufficient to impair seriously the result in the case of a robust individual but be quite enough to turn the scale unfavourably in a very sick patient. For this reason an effort should be made to obtain a maximum degree of improvement be-

fore operation, and in very sick people extraordinary care should be taken to avoid complications, and a fast, accurate, smooth operative technique practised. In bad risk patients a smooth twenty-minute operation may be life saving, whereas a clumsy fifty-minute operation may prove disastrous.

I know of no single factor that has contributed more to the pre-operative preparation of the hyperthyroid patient than the judicious use of Lugol's solution, as popularized by Plummer. Yet, I should like to express myself as very much opposed to the indiscriminate, periodical, and sometimes prolonged use of iodine in hyperthyroidism. This practice takes from the surgeon his most powerful weapon, as it is well known that a patient, after his first favourable reaction to iodine, (the optimum operative period) may relapse at a later date, after which iodine seems to be much less efficient, and the patient will accordingly be a more serious operative risk. I have in mind several cases of Graves' disease, who, after being treated with Lugol's solution for several months in varying doses, each experiencing the initial improvement, relapsed later, and went into a severe form of hyperthyroidism with diarrhoea and vomiting for some days before death. I saw these cases in consultation after their relapse and at no time after that could operation have been considered. Had the iodine in these cases been given as a pre-operative measure the operation would have been carried out after the initial improvement had appeared.

Haemorrhage is one of the commonest complications of thyroideectomy. Complete haemostasis should be obtained before the wound is closed, and should be tested by coughing or straining by the patient. Secondary haemorrhage will occur only following infection of the wound, usually in the form of cellulitis of the surrounding tissue.

Injury to a recurrent laryngeal nerve may be

* Read at the annual meeting of the Ontario Medical Association, Hamilton, Ontario, May, 1929.

a very serious complication. The position of the nerves should be thoroughly understood and then avoided. This can be done safely even in the most radical type of thyroidectomy. When one of these nerves is ligated or caught in a hemostat the patient usually responds with immediate inspiratory dyspnoea. If he is then asked to talk the error becomes obvious and the ligature or forceps may then be released. If one is not warned by such a sign the error in technique may not be recognized until some time later, when it is too late to correct it. There is no more distressing complication than a bilateral abductor paralysis of the vocal cords, sometimes requiring a hurried tracheotomy to prevent death.

Tetany is, fortunately, rather rare, and can best be avoided by leaving intact a considerable portion of the posterior capsule of the thyroid on both sides of the trachea. This can be done without sacrificing any of the radical features of the operation, and such technique has the added advantage of protecting the recurrent laryngeal nerves. I have not seen a case of tetany or nerve injury in my last eleven hundred thyroidectomies.

Acute post-operative hyperthyroidism is very rare when the patient previously has been thoroughly iodized. Pneumonia and embolus are both to be feared, but I know of nothing new in their prevention or treatment.

MORTALITY

In order to establish a basis on which to work I submit a list of the 8 deaths in the last 844 consecutive thyroidectomies which I have done since I last reported my mortality rate. This makes a mortality rate of 8 in 844, or 0.92 per cent.

CASE 1

A woman, 60 years of age, complained of the characteristic symptoms of hyperthyroidism. She had a large bilateral adenomatous goitre; pulse rate 104 to 120; blood pressure, 190-90; heart, definitely enlarged; basal metabolic rate after one week in bed, plus 68 per cent, a few days later, plus 60 per cent. She had suffered from a cerebral haemorrhage eighteen months previously, which caused a hemiplegia from which she had since almost completely recovered.

Three weeks' rest in bed, with Lugol's solution, during the last week brought her basal metabolic rate down to plus 45 per cent, and at this time I did a bilateral resection of a fairly large adenomatous goitre. Following the operation she seemed fairly well, but during the night her pulse became weaker, and the following day she steadily became worse and died at

5 p.m., thirty-two hours after her operation. There was no haemorrhage nor any sign of hyperthyroidism. She died apparently of a failing heart.

CASE 2

A young woman, 27 years of age, presenting an advanced state of exophthalmic goitre, had been sick for more than a year, and had a massive diffuse vascular goitre, protruding eyes, with great loss of weight. The heart was greatly enlarged; basal metabolic rate, plus 80 per cent; pulse 160; blood pressure 160-60; the legs were swollen, and there was some general oedema. Stereoscopic x-ray plates showed a greatly enlarged heart. The woman had taken Lugol's solution over a period of months. I kept her in bed for three weeks and then ligated both superior thyroid arteries. She was sent home to rest, returning three months later somewhat improved, but still quite sick. After further preparation, the right lobe alone was removed. The patient seemed quite well for twenty-four hours, then developed a typical form of acute post-operative hyperthyroidism and died twelve hours later in a thyroid crisis. This woman had received iodine therapy freely before operation, but responded poorly since she had been using it for some fifteen months.

CASE 3

A woman, 39 years of age, had been an invalid for eight years. She developed influenza during the epidemic of 1918 and following this exophthalmic goitre supervened. The following year part of one lobe was removed, which, she said, did her little if any good, and she had since spent most of her time in bed. I was called to see her six years later by her family physician, who was hurriedly called because she appeared to be choking. Examination revealed a massive goitre, mostly one-sided, with a great displacement of the thyroid cartilage and trachea to the opposite side. She was taken to hospital, where well marked hyperthyroidism of the exophthalmic type was found to be present, with profound loss of weight and a greatly enlarged fibrillating heart. The basal metabolic rate was plus 56 per cent. There was a complete paralysis of the vocal cord on the side corresponding to the lobectomy six years previously. Breathing improved slightly, but continued quite stertorous owing to pressure on her trachea. We kept her for a few days and decided to make an effort to remove the massive left sided goitre. This was done, but the patient died two hours after the operation. I am unable to state the cause of death, but it was probably from exhaustion and failing heart muscle in a very "bad risk" type of case.

CASE 4

This was a frail little woman, 51 years of age, with well marked exophthalmic goitre of some twelve months' duration. The pulse was consistently more than 150 per minute. The basal metabolic rate, on repeated tests, ran from plus 80 to 90 per cent. After ten days' preparation, ligation of both superior thyroid arteries was done. Ten days later the patient was sent home to rest. Three weeks later she developed a cerebral haemorrhage, causing hemiplegia, which after eight months had almost entirely disappeared. Her goitre in the meantime had become larger. She was again iodized and removal of the right lobe and isthmus was done. She did very well for three days, then developed signs of a failing heart and died two days later.

CASE 5

This was a woman, 54 years of age, with well marked exophthalmic goitre. Thyroidectomy was done. Two days after operation broncho-pneumonia developed

and she died two days later. The findings were confirmed at autopsy.

CASE 6

A man, 62 years of age, with a very large adenomatous goitre and hyperthyroidism of thirty years' standing. A few months before consulting me he had had a cerebral haemorrhage or embolus causing aphasia with mild paresis of one arm and one leg. This had greatly improved and speech had fairly well returned. He had a very large heart and auricular fibrillation. After the usual preparation, a bilateral resection of a very large adenomatous goitre was done, and during the day and evening the patient looked and felt well. Eighteen hours after the operation he became somewhat restless and cyanosed, his temperature went up to 104° F., and he died in this state the following day. He presented a picture very typical of acute post-operative hyperthyroidism.

CASE 7

A boy, 13 years of age, who when I first saw him, was an advanced case of exophthalmic goitre with a large, vascular, bilateral goitre. Basal metabolism was plus 75 per cent, and other findings were in keeping with this reading. He had been taking Lugol's solution for eight months, and had been getting worse the past few months. I left him for several weeks on rest and continued iodine treatment. He seemed to improve a little only, and I then did a bilateral radical resection of the goitre. He seemed none the worse for twelve hours, but after this he developed an acute thyroid crisis. His temperature went to 105° F., the pulse was 166, and he died the same day from what seemed to be acute hyperthyroidism.

CASE 8

This was a woman, 60 years of age, with well developed toxic adenomatous goitre of the intrathoracic type, and symptoms dating back several years. The basal metabolic rate was only plus 35 per cent. Pulse, 124; blood pressure, 174-90.

The adenomatous goitre was removed after the usual preparation, and the patient did well for two days, when she complained of pain in her chest, with a temperature of 103° F. She developed all the signs of a broncho-pneumonia and died two days later.

In these 8 deaths in 844 consecutive thyroidectomies, I would like to call attention to the fact that three of them had within eighteen months previously suffered from cerebral haemorrhage. In the other 836 cases, none had a history of cerebral haemorrhage. This to me is significant, and would suggest careful consideration before operating on toxic goitres following a history of cerebral haemorrhage. Two of the 8 deaths were from bronchopneumonia, neither of them in the cases giving a history of cerebral haemorrhage. Three of the 8 died apparently from post-operative hyperthyroidism. One of these was an old case of adenomatous goitre; another was a long standing exophthalmic goitre. Both of these patients had been using Lugol's solution for many months. I am of the opinion that these two cases might still be alive had they been

operated upon during their first improvement under the use of Lugol's solution.

I believe that prolonged hyperthyroidism is always a grave condition and the longer the disease has existed the greater the operative risk. The age of the patient is another important factor. Long-standing hyperthyroidism in old people is always a serious type to deal with. In the group of cases under review, five out of the eight deaths were in people more than fifty years of age, whereas the whole eight cases had been sick for a period of time ranging from one to thirty years.

In this series, no cases were refused operation. All bad cases were accepted, and an effort made to bring them into an operable condition, for the reason that many of the worst cases of advanced hyperthyroidism, with well marked heart failure, have been operated upon, and later these people have been able to carry on fairly well in their normal spheres of life. Were it not for these encouraging results many of the bad risk patients would be classed in an inoperable group, and our operative statistics would then show a still greater improvement in the mortality rate, but I should feel that surgery was not being used to the best advantage. In this series, all the deaths were in very sick patients who were recognized as being serious operative risks. In this group, the largest number of cases done consecutively without a death was 250, which only goes to show the importance of numbers in arriving at accurate statistics.

RECURRENT GOITRE FOLLOWING THYROIDECTOMY

Any surgeon who has been doing considerable goitre work over a period of years has had the disagreeable experience of meeting with a recurrent goitre, with accompanying hyperthyroidism, following what appeared to be a satisfactory cure from thyroidectomy.

The recurrence may manifest itself first a few months after thyroidectomy, or as late as many years following the operation. Graves' disease is the type of goitre most liable to this late complication. When the patient first returns for advice, the chief complaint is usually one of enlargement of the thyroid stumps, and this finding is what alarms the patient and causes him to hurry back to the surgeon, although defi-

nite evidence of varying degrees of hyperthyroidism will usually be found. When the patient is questioned, it will be found that some months before the tumour in the neck was seen many of the old symptoms were experienced, such as restlessness, irritability, palpitation of the heart, dyspnea on exertion, fatigue, and some loss of weight. I wish to point out that had the patient at this period received suitable treatment the goitre in all probability never would have developed. The treatment proposed is the administration of Lugol's solution in comparatively small doses, ranging from 5 to 10 minims twice daily, the dose being gradually diminished as the symptoms recede. Should there be the slightest recurrence of symptoms any time later, iodine should again be given, and for some time after all symptoms have disappeared. In these cases, it would appear that there is a physical state—call it iodine starvation if you will—that causes the general symptoms, and if this physical condition is allowed to persist it acts as a stimulus to hyperplasia of the thyroid stumps and a well marked goitre is soon developed. With this excess thyroid tissue present, iodine has not the curative effect previously noted, and a secondary operation for removal of the goitre will usually be necessary before a cure is established.

Marine states that the first pathological change in the thyroid tissue in the formation of colloid goitre is hyperplasia, and that if the iodine content of thyroid is kept at or above the normal minimum (0.01 per cent) this primary hyperplasia will not occur; hence the goitre will not develop.

It is probable that a somewhat similar condition exists in these cases of recurrent exophthalmic goitres, but with this difference, that when the iodine content of the remaining thyroid tissue falls below a normal minimum symptoms are produced. If iodine is then given to the patient, the iodine content of the thyroid tissue is raised and the symptoms disappear, but if iodine is still withheld the thyroid tissue responds by undergoing hyperplastic changes and symptoms increase in intensity; and when a well marked goitre has reappeared the excess of thyroid tissue acts in the same way as in the ordinary case of exophthalmic goitre before any operation has been done. This hypothesis might even be carried further and applied to the

original etiology and onset of exophthalmic goitre, and we might ask ourselves whether iodine given during the first appearance of symptoms of hyperthyroidism could arrest the disease and prevent thyroid hyperplasia. If this hypothesis could be substantiated in practice the prevention of exophthalmic goitre would then be in sight, and iodine would have scored again in preventive medicine.

It has been my practice to give Lugol's solution in all cases of Graves' disease for two to three and a half months following thyroideotomy, in gradually diminishing doses, and to instruct the patients that if any of the old symptoms recur after Lugol's solution has been discontinued, they should resume its use gradually weaning themselves of the medicine as they find no tendency to recurrence of the symptoms without its use. I have had no recurrence of goitre in the past few years in patients that have co-operated in this way, but I have repeatedly seen patients who have consulted me some months or a few years after operation complaining of symptoms only, with no evidence of thyroid enlargement. In these cases all symptoms have disappeared when the treatment suggested was carried out. The recurrent goitres that I have seen from my own practice fall fairly well into a non-co-operative group, typified by the following case:

Mr. R. consulted me on October 25, 1927, a well marked case of exophthalmic goitre with all the typical findings, including well marked exophthalmos and a basal metabolic rate of plus 52 per cent. He was put to bed and given Lugol's solution and improved promptly. On November 3rd, nine days after his first appearance at my office, I did a radical bilateral resection of a moderately large vascular goitre. His convalescence was uneventful. Two weeks after operation he was in my office feeling very well, and as he stated entirely free of symptoms. He appeared as instructed two weeks later quite well, and, although he had the usual instructions to report later and to continue the use of Lugol's solution, he did not appear again until April 2, 1928, five months after operation, complaining of a recurrence of his old symptoms, loss of weight and strength, irritability, free perspiration, and pounding of his heart. When I asked him why he had not returned sooner, he stated that he had felt perfectly well, had gone back to his work of organizing a new business, had worked hard, and after leaving my office three and one-half months previously had discontinued the use of iodine and had taken none since.

Examination revealed a nervous, fidgety man, with a moist skin, marked tremor, a pulse rate of 134, with, in short, all the manifestations of hyperthyroidism. There was, however, no visible or palpable evidence of an increase in size of the thyroid stumps. I advised him to rest for ten days and take Lugol's solution, ten minims twice a day, and then report back for re-

examination and advice. His next appearance was on November 28, 1928, nearly eight months later, when he complained of recurrence of his old symptoms once more, but also of enlargement of his neck. He stated that when he resumed the iodine eight months earlier all his symptoms disappeared, and he resumed work, but discontinued his medicine. A few weeks after this his symptoms reappeared, but he kept on working, disregarding them, and had returned because he had recently noticed the goitre reappearing and getting steadily larger. Examination revealed a well marked bilateral firm growth on either side of upper trachea, undoubtedly a hyperplastic goitre, with all the manifestations and findings of well marked hyperthyroidism. I advised him to rest for a time, and once more gave him Lugol's solution. He improved and resumed work ten days later, but to a restricted degree. He reported to my office every two weeks during the winter, but the goitre became no smaller and hyperthyroidism persisted. I then advised a secondary operation, and on March 13, 1929, removed both lobes and what I could find of the isthmus, leaving only shreds of thyroid tissue attached to adjacent structures. He reacted more profoundly to this than to the first operation, chiefly, I think, because, as already stated in this paper, the greatest resistance to operative interference in hyperthyroid patients is established during the first eight to twenty days after the initial use of iodine. This patient made an uneventful recovery and seems quite free of symptoms up to date. He went back to work four weeks after his operation. He is, of course, still using iodine. I think that had this man co-operated in the matter of reasonable personal care, and taken Lugol's solution as advised, he never would have developed the recurrence, and even after the first recurrence of symptoms, I think his co-operation in this respect would have prevented the regrowth of his goitre.

I should like to urge that thyroidectomy should be considered only a step, probably the major step, in the management of Graves' disease, and the patients should thoroughly understand this, and be carefully coached in the importance of co-operation following their immediate post-operative convalescence. Undoubtedly, a fair degree of rest and a limited amount of work and responsibility should be indulged in, but abstinence from these may be carried too far, and I prefer to permit patients to resume work comparatively early, and have

them happy, rather than idle and discontented. When they first resume work they should spend long nights in bed and rest as much as possible. This will tend to compensate for the energy lost at work. The type of operation performed has a definite bearing on the clinical result. I have been accustomed to perform a fairly radical operation, leaving only a small amount of thyroid tissue. This favours complete recovery and in such cases the judicious post-operative use of iodine together with an orderly even mode of living should prevent any recurrence.

There is another type of case however, one who has had insufficient thyroid tissue removed, and in this case we often see persisting morbidity which gradually increases and the goitre may soon reappear. In such a case it is doubtful whether we should expect iodine to prevent aggravation. The mistake was an operative one.

It is difficult to know just how much thyroid tissue to leave in each case, especially since the pre-operative use of iodine has caused such marked changes towards involution in the character of the thyroid tissue, bringing about a disproportion between clinical and histological findings as we were accustomed to find them previous to its use. In thyroidectomy for Graves' disease, I favour erring on the side of radicalism, preferring to cure the patient of hyperthyroidism and take the small chance of resulting hypothyroid function which when seen is usually quite transient, rather than remove too little thyroid tissue and leave the patient improved only, with all the added probabilities of a recurrence of severe hyperthyroidism.

THE COMPLEMENT-FIXATION REACTION IN RABIES.—A. C. Marie and A. Urbain have examined the serum of a rabbit immunized against rabies for the presence of sensitizing antibodies. The serum, after filtration through a Chamberland L3 candle, was found to neutralize ten times its volume of a 1 in 100 suspension of fixed virus, whereas normal serum was unable to neutralize even one volume. Precipitins were demonstrated by mixing the serum with a 1 in 100 suspension of virus, which had been filtered through paper. To show the presence of complement-fixing antibodies two antigens were used. The first, a cooto-antigen, was prepared by grinding up a rabid brain in ten times its volume of saline, heating to 100° C. for half an hour, centrifuging, and removing the supernatant fluid; the second was prepared by grinding up the finely pulverized brain in nine volumes of saline, leaving overnight in

the ice-chest, and pipetting off the supernatant fluid. Using the cooto-antigen it was found that, though 10 units of complement were fixed in the presence of a rabid serum from an animal immunized against rabies, the same result was obtained with a suspension of a normal or a herptic brain. On the other hand, using the unheated antigen, a specific reaction was obtained; the rabid brain in the presence of an antirabic serum fixed 150 units, and in the presence of normal rabbit serum only 15 units; a herptic or a normal brain in the presence of an antirabic serum fixed 30 units, and in the presence of a normal serum 15 units. It would therefore appear that an antirabic serum contains neutralizing antibodies—the latter being demonstrable by a fresh but not by a heated antigen.—*Brit. M. J.* 2: Epit. 36, Sept. 7, 1929.

VACCINATION AND ENCEPHALITIS*

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MYELITIS, or encephalomyelitis, following such diseases as measles, smallpox, chickenpox, mumps, and other acute infections, has been recognized for many years. Barlow, in 1887, reported a case of rapidly ascending myelitis in a young man twenty-three years of age, ill with measles. The onset of the myelitis was on the ninth day after the onset of symptoms of measles, and six days after the appearance of the rash. He quoted an earlier case, reported in 1790. The occurrence of myelitis in the course of smallpox has been reported by numerous observers. In varicella, also, myelitis has been described repeatedly, a review of the reported cases having been published recently.⁴

In 1917 Von Economo published a report of a small outbreak of an acute nervous disease to which he gave the name encephalitis lethargica. This name was given as the lethargic state was the most striking symptom of his cases. Within the following year sporadic cases were recognized in other countries, including France, England, and Holland. The incidence of this disease increased steadily in England, reaching a maximum of 5,039 cases in 1924. In Canada sporadic cases have been recognized from time to time, and two severe epidemics occurred in Winnipeg in 1919 and 1921. The clinical picture of encephalitis lethargica as it occurred in various outbreaks has varied greatly. Outbreaks were reported in which the characteristic lethargy was almost completely absent, and replaced by delirium or insomnia. The name, therefore, of encephalitis epidemica is to be preferred as more expressive of the nature of this disease. In spite of intensive investigations, clinical and research studies, there is no agreement regarding the causative agent. That the disease, however, is communicable has been definitely established.

The focusing of attention on this disease may have been a factor in the more general recogni-

tion during recent years of encephalitic complications in certain infectious diseases. Such complications are now apparently of fairly frequent occurrence. For example, Neal and Applebaum saw eight cases of measles-encephalitis in 1926, and record four others which they had seen in the previous eight years; Lust (1926) wrote that recently, within a period of three months, he came across four cases of measles-encephalitis, and that at a time when measles was not at all prevalent; Schick (1926), who also had four such cases, three of which were fatal, was of opinion that measles lowered the resistance to attack and invasion by a neurotropic virus.

POSTVACCINAL NERVOUS DISEASE

The striking observation was made that among the cases of encephalitis occurring in London and its environs from November 14th to December 15th, 1922, eleven cases had been vaccinated recently; four of these died, and the pathological picture in three was studied minutely by Turnbull and McIntosh.⁵ These observers recalled a similar pathological picture seen by Turnbull in 1912 in the central nervous system of a boy, who, after a recent vaccination, had shown signs and symptoms indicative of disease of the central nervous system, and which at the time was diagnosed poliomyelitis. The picture was, in their opinion, distinctly different from that of poliomyelitis or encephalitis lethargica. In the following year, 1923, under the influence of a special inquiry instituted by the Ministry of Health, fifty-three cases were recognized in England. No other cases were reported till April, 1925, and from that date till February, 1926, only five cases were recorded. From February, 1926, to December, 1928, about ninety cases have been reported, but the diagnosis or relationship to vaccination has not been investigated in all these. Lucksch, of Prague, in 1924, reported the occurrence of fatal encephalitis following vaccination in three children in whom the encephalitic symptoms developed ten days after vaccination. Bastiannse reported the oc-

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currence in Holland, in 1924, of a case of encephalitis following ten days after vaccination, and subsequent investigation has brought to light one hundred and twenty-four cases, with thirty-eight deaths, in Holland from 1924 to August, 1927. Sporadic cases have been reported in Portugal, France, Switzerland, Poland, Austria, Czechoslovakia, Italy, and other countries. In the United States about ten possible cases have been reported; in some of these the diagnosis has been formulated retrospectively. No cases have been recorded so far in Canada.

THE CLINICAL PICTURE

The clinical picture of the observed cases of postvaccinal encephalitis is as varied as that of encephalitis epidemica. The very excellent description published by Armstrong³ affords a good picture of the various phases of the malady:

The symptoms in this complication usually appear suddenly and have their onset in 70 per cent of the cases from the tenth to the thirteenth day, inclusive, following vaccination. That is, they appear when the vaccination, usually primary, is at its height.

The symptoms as recorded for different cases vary somewhat, but four symptoms are quite constantly noted, namely: (1) fever (104°F., or higher in severe cases); (2) vomiting; (3) headache; (4) stupor or coma.

The stupor may develop within a few hours after the onset of the symptoms and is always present in fatal cases.

Symptoms of meningeal irritation are usually present in conscious cases, absent in others. Convulsions are common in young children, as are also cramps or spasms. Trismus has been occasionally observed, and is worthy of note, as it may lead to confusion of the ailment with tetanus. Varying degrees of paresis or paralysis are noted in some cases. The eye muscles usually escape. The Babinsky is usually positive, a point considered as of high diagnostic significance. The spinal fluid usually shows little or no change by chemical, microscopical or bacteriological studies. The pressure may be slightly increased, however, and cell counts as high as 200 to 400 have been observed.

Death, which follows in from 30 to 40 per cent of the cases, usually occurs from the third to the tenth day following the onset of symptoms. Recovery, when it takes place, is usually rapid and complete; however, some degree of crippling has been noted in a few cases.

PATHOLOGY

Careful study of the limited pathological material has been made by Turnbull, Perdrau and others. The lack of agreement and the various interpretations of the findings indicate an uncertainty in the minds of the pathologists as to the identity of the disease and its possible relationship to poliomyelitis, encephalitis lethargica, vaccinia, or other acute infections.

In the gross, there may be no evidence of any pathological condition; slight flattening of the

convolutions due to oedema has been recorded, so too, congestion, very occasional small haemorrhages; and, according to Perdrau,⁷ softening of both brain and cord in small areas can be recognized in some cases. Microscopically, perivascular mantling may be found as in encephalitis lethargica, and in as haphazard a distribution, but according to Perdrau the primary and essential lesion is an acute demyelination in the neighbourhood of the blood-vessels, both in grey and white matter, though affecting the white matter more. Secondary to this there occurs a proliferation (or infiltration) of cells which are apparently of glial (microglial) origin for the main part. This extra-adventitial lesion is not found, according to Perdrau, in encephalitis lethargica. An infiltration in the perivascular space is chiefly lymphocytic in character, with few plasma or plasmacytoid cells, and only an occasional polymorphonuclear cell. In the more prolonged cases macrophages, or endothelial phagocytic cells, have been described. Perdrau points out that this picture of acute demyelination is not one peculiar to postvaccinal encephalitis, but is found in encephalitis occurring during measles, smallpox, varicella, and other acute infections. It is similar, too, to the picture found in certain cases of paralysis following the Pasteur treatment.

EPIDEMIOLOGY

Three commissions have investigated the subject of postvaccinal encephalitis. The first committee, under the chairmanship of Sir Frederick Andrewes, was appointed in England in November, 1923, and reported in May, 1925.¹ A second English committee under Sir Humphry Rolleston² presented its report on the whole question of vaccination in July, 1928. A committee of the Health Organization of the League of Nations, under Professor Ricardo Jorge, Director General of Public Health Services, Lisbon, met at Geneva in August, 1928.³ These committees have studied all available data.

From the epidemiological studies certain findings of importance have been made. These may be briefly reviewed as follows:

Distribution.—The relative absence of cases in one country, as in Denmark, and the prevalence in neighbouring countries, as in Holland and England, is striking. Rural communities and small villages have suffered to a greater

extent than cities. A distinct tendency for cases to occur in small groups, occasionally more than one in a family, has been noted.

Age.—The incidence and mortality has been definitely higher in older children of the 6 to 14 age group than in infants and adults. A few cases have been reported in infants, but the relative freedom of this group from encephalitis as a complication is a fact of great practical significance in the practice of vaccination.

Possible Relation to Other Communicable Diseases.—No definite relationship has been shown to exist between cases of postvaccinal nervous disease and the occurrence of outbreaks of poliomyelitis or encephalitis epidemics, although in some instances these diseases were occurring in the community simultaneously. In fact, the early cases in Holland, on account of this association and their pathology, were thought to be true cases of epidemic encephalitis. Subsequent surveys in other countries have not shown any such association constantly.

Possible Relationship to Vaccination.—Study of the cases, in which by investigation other diagnoses were eliminated and recent vaccination confirmed, has shown that 70 per cent had the onset of nervous complications from the tenth to thirteenth day after vaccination. Practically all the cases occurred after primary vaccinations. In all the cases the vaccination ran an apparently normal course, the site not showing any evidences of unusual inflammation or delay in healing. (It must be remembered that four large insertions have been, until now, the usual practice in vaccinating in England. Similarly, in Europe, vaccination has been performed using larger areas of insertion, and with greater trauma than is the practice on this continent.) There does not appear to be any particular relationship to any one strain of vaccine virus. In Holland, which suffered most severely, vaccine was obtained from many sources, including Denmark, in which country no cases had occurred. When the Danish vaccine was used, cases continued to occur as frequently as when vaccine prepared in Holland was used. As well as the constancy of the onset of symptoms about the tenth to twelfth day after vaccination, another fact that tends to show an apparent relationship to vaccination is that in one hundred and six cases reported as encephalitis lethargica in Holland in 1926, it was found

on enquiry that thirty-six gave a history of recent vaccination.

On such findings the investigating committees had to base their conclusions. It is not surprising, therefore, in view of the very few cases that have occurred, and the complexity of the findings, that complete agreement was not attained. There was agreement, however, that the condition was definitely related to vaccination, the constancy of the incubation period being evidence of that relationship. But, with one dissenting voice, there was agreement that vaccine virus was not the causative agent, but acted in some way, as it was suggested measles may act, in lowering the resistance to some other virus. The hypothesis that the causative agent is widely disseminated among the people in the countries in which the disease has appeared, but is capable of causing disease only under the influence of some other agent such as measles, smallpox, mumps, or vaccinia, was formulated by the Andrewes Committee as the most probable explanation of postvaccinal nervous disease. In this the later committees concurred.

This hypothesis receives strong support from the failure to find any one strain of vaccine more involved than others; from the fact that persons vaccinated with one lot of vaccine showed no encephalitis, whereas persons in another district, of similar age groups, and vaccinated with the same vaccine showed occasional cases of encephalitis; from the grouping of cases in contrast to the general distribution of the vaccine; from the greater incidence in children of school age than in infants, as school children come into contact with more varied environmental factors than infants; and from the fact that cities were less affected than rural communities.

CONSIDERATIONS INVOLVED

Certain countries, in which the condition has occurred, have altered the regulations in regard to compulsory vaccination. Holland has temporarily suspended compulsory school vaccination. The Minister of Health of England and Wales has advised that compulsory vaccination of children of school age, or adolescents, should not be enforced, unless there has been contact with smallpox. In accordance with the recommendation of the Rolleston Committee that "in place of the officially advocated four insertions

trial be made of vaccination and revaccination in one insertion with a minimum of trauma," the Ministry has so altered the regulations.

A proper vaccination to-day is one which presents a vesicle of less than 1/2 inch in diameter with a final scar no greater than 1/4 inch in diameter. This is accomplished by vaccinating with the least possible trauma and the omission of all dressings. The least possible trauma is produced when a short scratch 1/16 inch, or a single puncture, or any of the recent modifications of these fundamental methods, is used. The expression "scratch method" even when the word "short" is linked with it is apt to give a wrong idea of the actual procedure. The sterile needle, being held firmly at a slight angle to the prepared skin, is pressed against the surface at the same time pulling the point downward for the shortest possible distance. When carried out in this manner a minute scratch of about 1/16 inch is produced, roughly about the size of a printed comma on this page. The vaccine is then expelled from the capillary tube and gently rubbed into the scratch using the side, not the point, of the needle. In our experience this method gives most satisfactory results.

If the vaccinator knows that the vaccine is fresh or that it has been kept properly in a refrigerator and is not out-dated, one insertion is satisfactory. The many opportunities for deterioration of the virus in shipment over long distances and in inadequate after-storage render it expedient in Canada to make two insertions, particularly in the rural districts where observation and the opportunity of a second vaccination, in case of failure, are not readily obtained. In our experience two small lesions well separated so that they do not coalesce, give rise to no greater discomfort than one, and heal as readily, with much less chance of complications than a single larger lesion produced by abrading a larger area, or by multiple punctures. In revaccinations the two insertions⁹ one by the short scratch and one by the puncture method, have advantages in giving a reaction more easily read, and, at the same time, increasing the possibility of getting a definite "take."

Certain other points which have long been recognized merit added emphasis at this time. As far as possible no one, child or adult, should be vaccinated when suffering from any infection.

Vaccinia itself is an infection and should be treated accordingly; that is, the vaccinated person should not be submitted to undue fatigue, or exposure to untoward conditions, and should be strictly under the care and direction of the physician, not only in performing the vaccination, but until the lesion is properly healed. And until the question of postvaccinal encephalitis is further elucidated, vaccination should not be performed when poliomyelitis, encephalitis, or such other acute infection is epidemic. The importance of performing vaccination in infancy has been recognized in the past, but in the light of the findings of these commissions it merits additional emphasis on account of the great rarity of any complications at this period. Revaccination early in school life and again on leaving school affords an immunity of high degree, probably for life, and the individual is thus given the maximum protection with, at the same time, the least inconvenience and the least possible chance of complications, cerebral or otherwise.

No cases of this condition have been reported in Canada, and but very few cases in the United States. Should it occur in this country, it is desirable that the health authorities should be notified immediately in order that all aspects of the situation may be thoroughly investigated. If the hypothesis as to the cause advanced by the commissions, is correct, and if we are to profit by the experience of others, and avert, if possible, the occurrence of the malady here, vaccination should be performed with due regard to the precautions noted.

The question of the necessity for vaccination and revaccination has not altered. In spite of the mild smallpox with which Canada has become acquainted in the last few years, it is only necessary to recall the Windsor experience with smallpox in 1924—32 deaths among 67 cases—to show its importance. "None of the facts considered in this report", concludes the Andrewes Committee, "lead the commission to the conclusion that there is any reason for discontinuing the use of vaccination, which remains the most powerful weapon against smallpox that we possess."

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THE TREATMENT OF DIABETIC COMA IN CHILDREN*

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DIABETIC coma is one of those conditions in which the difficulties of the situation have been so stressed that a paralyzing fear has been engendered which prevents the inexperienced from making any effort to treat it. The truth of the matter is that while some cases present well-nigh insurmountable problems, and most are, perhaps, better treated in hospital, many could be successfully treated at home if the basic principles of their treatment were borne in mind, and, better still, simple preventive measures would save most patients from ever going into coma.

The reports from some clinics suggest a decline in the incidence of diabetic coma and a generally low morbidity among children. The figures obtained at the Hospital for Sick Children, Toronto, bear out neither of these statements. During the past six and one-half years, since insulin became available for treatment, 51 comatose cases have been admitted to this hospital. In all the coma was sufficiently severe that the patient was unconscious at least part of the time, had some degree of hyperpnea, and was unable to take fluid by mouth. Many others in an acidotic or precomatose state were admitted but are not included in this number. This rather high incidence is not explained by repeated attacks in a few individuals, as it included forty-two different patients. In nearly half of the number, coma occurred at the onset, or at least at the first recognition of the illness. In the remainder it resulted from dietary indiscretions, infections, the sudden discontinuance of insulin,

or a combination of these factors. In those patients in whom coma first led to the diagnosis of diabetes, a recognition of the symptoms of the disease and its rapid progress in childhood would have prevented coma in many and death in some. However, in the majority of cases admitted the nature of the illness was not even recognized when coma developed, but they were sent in as uremia, laryngeal obstruction, acute abdominal conditions, or were not diagnosed at all.

Possibly one reason why greater concern is not felt about the development of coma is the feeling of safety that insulin gives. This faith in insulin is justifiable to a reasonable extent, but there are limitations to the chances it allows one to take. No one disputes the potency of diphtheria anti-

TABLE I.
The Effect of Delay in Treating Diabetic Coma on its Mortality

Time	Number of Cases	Number of Deaths	Per Cent Mortality
0-24 hours	15	0	0
24-48 hours	10	2 (d.pneu.)	20
48-96 hours	17	8	41
5 hours or longer	9	7	77

toxin, but we respect the fact that its effectiveness is greatest when it is given early. The time element is just as important in the insulin treatment of coma. It was somewhat disappointing, in studying the cases admitted to the Sick Children's Hospital, to find that patients in coma were not being admitted at any earlier stage of their illness now than four or five years ago. Closer study shows, however, that the late admissions now are more often treated cases who have dis-

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continued their insulin without any indication for doing so, and apparently have almost deliberately allowed severe symptoms to develop before seeking aid. The effect of delay in starting treatment is shown in the table.

Mortality rates in diabetes, as shown in insurance statistics, have not fallen as consistently as it was anticipated they would following the discovery of insulin. Diabetic coma, with or without infection, remains the chief cause of death; 80 per cent of the fatalities among our cases were attributable to it. It is somewhat disconcerting to find among our hospital-treated cases that the steady fall in the death rate, which started in 1923 at 60 per cent and reached its minimum in 1927 with 12 per cent, has been succeeded by a rise to 25 per cent in 1928, and by another higher still so far this year. Consideration of the fatal cases of the past two years shows them to belong first to an increasing number of careless, overweight diabetics, who have more or less invited trouble and then delayed seeking help until too late, and, secondly, to those in whom there has been a coincident infection of sufficient severity to have itself caused death.

A few words might be said here of the symptomatology of diabetes and coma in children, as failure to diagnose the disease is responsible in many instances for the failure to institute proper treatment in time. Symptoms of the disease so frequently become evident following an acute infection that many regard the latter as the causative factor. In others, while focal infections are present, one is at a loss to account for the development of the disease. The appetite is usually good, sometimes excessive, and in spite of this the child fails to gain, or even loses weight. Polyuria and polydipsia are present in varying degrees, the former often appearing as enuresis. Constipation is usually marked. In babies and young children, failure to thrive and constipation, in spite of frequent changes of food, are often all that are noted, the degree of emaciation to some extent protecting the infant from more acute symptoms for a time. In others, acute symptoms of acidosis, such as abdominal pain, vomiting, and hyperpnea, are the first noted. Such patients may die within a week of the onset, so rapid is the progress of the disease if unchecked. Rapid loss of weight occurs in the acidotic. Their abdominal pain and the associated rigidity and coffee-ground vomitus are very suggestive of an acute abdominal condition. The degree of

drowsiness is not a very good indication of the severity of the coma, so that any degree of stupor, even if it is inconstant and the child is fairly bright in the interval, should be regarded as needing immediate attention.

Treatment may be discussed under two headings, *viz.*, preventive, and curative. The former still remains the best in spite of the great change insulin has made possible in the latter.

The first step in the preventive treatment consists in the early diagnosis and adequate treatment of all cases of diabetes. The latter is essentially the provision of a suitable diet, or diet plus insulin, to make and keep the patient's blood sugar normal and maintain this weight at or a little below normal. The fat diabetic is a poor risk, and his chances of recovery from coma greatly lessened should it develop. Even when treatment is not started for some time after acidotic symptoms develop the emaciated diabetic has a fair chance of recovery. Secondly, the adequate removal of all foci of infection not only exerts a beneficial effect on the course of the disease but simplifies treatment, because of the greater freedom from intercurrent infections that eradication permits.

A word may be said here about the proper treatment of infections, when they do develop, as their improper handling often precipitates coma, from which their presence decreases the chance of recovery. Carbohydrate tolerance is lowered by infections of all kinds and degrees. In their presence, therefore, one must either give less food or more insulin to compensate for this depression. Empirically, we have made it a practice to instruct mothers to leave the insulin unaltered but to decrease the diet to two-thirds of its normal value. Such a measure enables them to successfully handle mild infections without any permanent decrease in the carbohydrate tolerance or the development of acidosis. Insulin must on no account be discontinued. Such a procedure, without indication of sufficient improvement in pancreatic function to warrant it, is always dangerous, but during an infection is likely to prove disastrous. If the child is too ill to take food, carbohydrate must be given parenterally. This is readily accomplished by giving 5 per cent glucose subcutaneously, followed by a hypodermic of insulin, in the proportion of one unit of insulin for each gram of glucose given. This procedure may be carried out three or four times daily until the child is able to take small amounts of fluids by mouth.

Orange juice, sweetened tea, or 5 per cent glucose may be given at this time. Diabetic patients with even mild infections should be kept in bed, in order that their metabolism may be reduced to a minimum.

When the worst happens and coma develops, what should be done? First, as pointed out before, it is urgent that treatment be started without any delay if the best results are to be secured. The actual procedure to be followed may be discussed chiefly under the indications for treatment and how such may be best met.

(1) The metabolism should be reduced to the lowest level possible, by putting the patient to bed, the careful application of external heat, and the provision of a good nurse who will spare the patient any exertion.

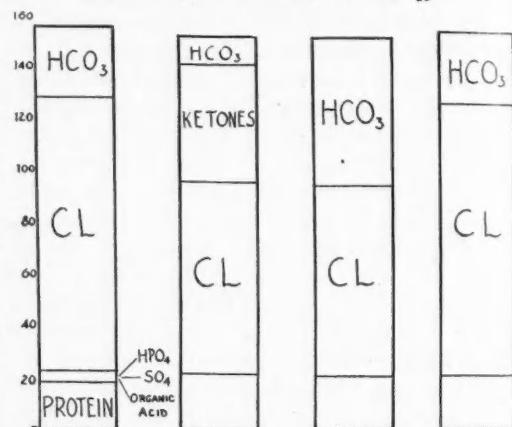
(2) Adequate fluids must be given. All comatose patients are dehydrated and need large quantities of fluid. From one and a half to four litres, depending on the age of the child, must be given in twenty-four hours. The bulk of this must be given parenterally during the first twenty-four hours, as the patient is either too unconscious to take it by mouth or unable to retain what he does swallow. Five per cent glucose in normal saline may be given subcutaneously and repeated every 4 to 6 hours, or in more urgent cases part of it may be given as 10 per cent glucose intravenously. The Murphy drip method should be used as much as possible. As recovery begins, small amounts of orange juice, or 5 per cent glucose by mouth, may be given frequently.

(3) The metabolism must be converted to a carbohydrate one. This is usually accomplished with ease in the underweight individual, but becomes increasingly more difficult for each pound of excess fat he has been allowed to accumulate. In severe cases, 10 per cent glucose is given intravenously. The injection must proceed slowly and the total amount given must not exceed 10 c.c. per pound of body weight. The pulse should be watched, and if any weakening or increased irregularity occurs the injection should be stopped at once. Immediately afterwards, normal saline should be given subcutaneously. The fluid injections must be repeated every 4 to 6 hours until the patient is able to take and retain fluids by mouth. Five per cent glucose is used. It is seldom if ever necessary to repeat the intravenous injection. In less urgent cases, all the fluid may be given subcutaneously and by rectum and the intravenous route left untouched.

When improvement permits it, small quantities of orange juice or glucose are given *per os* at frequent intervals, and the parenteral administration discontinued as soon as sufficient quantities of fluid and carbohydrate can be given in this way.

(4) Chlorides must be given in sufficient amount to make up for the depletion usually present. I mention this next to carbohydrates, because the over-zealous administration of carbohydrate and neglect of the chlorides may save a patient from an acidosis only to give him an alkalosis. It is easy to explain the need for chloride administration by the use of charts.

BLOOD ACIDS IN TERMS OF $\frac{N}{10}$



In column 1 is represented the normal acid portion of the blood. The base occupies a similar column of equal height but does not concern us much here. It will be noted that chlorides and bicarbonates, in terms of deci-normal acid, occupy the large proportion of the acid portion of the blood. Column 2 represents what happens in diabetic acidosis; the chlorides and bicarbonate are both decreased in amount and ketone bodies occupy a portion of the space which they would normally occupy. Now, when large quantities of glucose and insulin are given, the blood changes are produced such as those in column 3. It will be seen that ketones have gone, the bicarbonate has increased not only to occupy their space but that of the lowered chlorides as well, and alkalosis has been produced. If, however, sodium chloride be given with the glucose, which may be made up in normal saline, the chlorides will have been increased as the ketones decreased, and the rather labile bicarbonate will have been kept within its normal limits. One saline administration is

adequate in most cases, but when vomiting has been prolonged or is persistent more should be given. Should the timely administration of saline be neglected and the development of alkalosis be suspected from the deepening coma or prolonged respirations, 2 to 4 grams of ammonium chloride should be given by the stomach tube.

(5) Insulin is not mentioned late because of its unimportance. It is the specific in the treatment of diabetic coma, without which in most cases one would not be able to convert the metabolism to a carbohydrate one nor rid the body of its excess fatty acids. As mentioned before, it is like certain other specifics in that it suffers a marked decrease in its potency when its administration is delayed. It should be given as soon as diabetic coma is diagnosed. Should the patient be going to hospital, but if time will unavoidably be lost before reaching it, 40 to 50 units of insulin may, with great advantage, be given at once. If treating the patient either in hospital or at home, the first insulin may be given intravenously with the glucose in those cases in which the depth of the coma or the duration of the symptoms make rapid action imperative. In such cases two units of insulin may be given with each gram of glucose. In those whose condition warrants less urgent treatment, insulin in the proportion of one unit for each gram of glucose may be given by the hypodermic method whenever the subcutaneous injection of glucose is made. After the patient is able to take adequate carbohydrate and fluid by mouth, small doses of insulin (10 to 15) units may be given every 4 hours, until the patient becomes sugar free, or his condition warrants placing him on a diet, when the insulin may be injected in small doses before meals. It is not advisable to keep the patient aglycosuric until he is fully conscious, because of the danger of hypoglycæmia.

(6) The gastro-intestinal tract usually demands some attention in the successful treatment of coma. The stomach is usually dilated, sometimes to an extreme degree. If acidosis has been present any time, coffee-ground material is usually either retained in the stomach or vomited. In those cases in which the distension and the vomiting persist in spite of the general treatment of the condition, a careful lavage with soda

bicarbonate, one drachm to a pint of water, is indicated and is often distinctly beneficial. There is no real reason for employing it as a routine procedure in all cases. Constipation is usually marked and the progress toward cure is often checked by the presence of retained fecal matter. High colonic irrigations are to be preferred to cathartics. They should be repeated every 4 hours until relief is obtained. Normal saline, or the sodium bicarbonate solution mentioned above, may be used. Further care of the gastro-intestinal tract consists of the use of easily digested diets after recovery from coma.

(7) Circulatory failure is often a contributory cause of death in diabetic coma. It should be guarded against while carrying out therapeutic measures, particularly the intravenous administration of fluids, by slow injection of the latter and not giving more than 10 c.c. per pound of body weight. When these precautions are taken, the pulse is often much better afterwards. Hypodermic stimulation is usually needed in severe cases. For this purpose digitalin every 4 hours, or alternated with caffeine sodium benzoate in the worst cases, so that stimulation is given every two hours, is valuable.

(8) Bicarbonates are considered by many to have had their day in the treatment of diabetic coma. It is, perhaps, well that they lie buried, and yet, in some few cases whose progress has seemed slower than anticipated, a few small doses of sodium bicarbonate by mouth have hastened recovery. They should never be given intravenously because of the danger of this procedure, and, of course, their subcutaneous administration is prohibited by their local irritating effect. In most cases none need be given; in the others, three or four, 5 grain doses, every 4 hours, are beneficial and adequate.

SUMMARY

Diabetic coma is an emergency still frequently encountered and responsible for a large proportion of the fatalities in diabetes. It is best treated by preventive measures, such as the early diagnosis and adequate treatment of all cases of diabetes, and the wise handling of its complications. Insulin provides a specific form of treatment for coma which will cure in nearly 100 per cent of cases, when it is recognized that diabetic coma is an emergency and must be treated as such.

CLINICAL CONSIDERATIONS IN THE MANAGEMENT OF THE DIABETIC*

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IT is hardly necessary to dilate upon the possible results to be obtained in the treatment of diabetes mellitus to-day. It is now possible to subject diabetics to major operations and general anaesthesias of long duration. Diabetics, to-day, are able to resist severe infections, such as pneumonia, etc., much better than in the days prior to the use of insulin. In spite of the many conditions, both medical and surgical, which may complicate diabetes and which are frequently met with in hospital practice, the diabetic mortality rates in these institutions are low and reflect the satisfactory methods of present day treatment. In our clinic, the mortality rate approaches that of the normal population death rate. This is shown in Table I. Here are given the ratios of actual to expected deaths from diabetes before and since the advent of insulin.

It is the ratio of the actual to expected deaths which gives a clear insight into the effect of any disease upon mortality. For example, of 10,000 people living in England at the age of forty years, 97 are expected to die before their forty-

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TABLE I.

ANNUAL ACTUAL TO EXPECTED DEATH RATIOS FOR ALL AGES AMONGST PATIENTS RESIDING IN MONTREAL AND ATTENDING THE CLINIC FOR DIABETES AT THE MONTREAL GENERAL HOSPITAL.

Year	Actual Expected	x 100
1921.....	535	
1922.....	660	
1923.....	280	
1924.....	243	
1925.....	200	
1926.....	109	
1927.....	107	
1928.....	124	

first birthday is reached. If we were to find that of 10,000 diabetics living in England at the age of forty years 194 failed to reach the forty-first birthday the death rate would be twice the normal, or expected, population death rate. That is, the ratio of actual to expected deaths is a quantitative expression of mortality.

These satisfactory mortality rates just shown are, I believe, not the result of chance, but due to the consideration of many necessary factors in the treatment of the disease. These will be presently discussed. On the other hand, in

TABLE II.

DEATHS FROM DIABETES MELLITUS PER 100,000 POPULATION BEFORE AND SINCE INSULIN.

	1921	1922	1923	1924	1925	1926	1927	1928
England and Wales:.....	10.8			10.9	11.2	11.5	12.6	13.1
London.....			9.8	9.8	9.3	10.4	10.6	
Edinburgh.....	9.3					9.5	9.0	9.0
United States:.....								
Total Registration Area.....	16.8	18.4	17.9	16.6	16.9	18.0	17.5	
Cities in Registration States.....	20.2	22.4	21.9	20.2	21.1	22.6	22.4	
Rural Part of Registration States.....	13.6	14.9	14.3	13.4	13.1	13.9	13.3	
Registration Cities in Non-registration States.....	17.0	15.1	14.9	12.3	15.3	14.7	14.1	
All Registration Cities.....	20.1	22.2	21.7	20.0	20.9	22.3	22.1	
Large Cities:								
Baltimore.....	22.1	26.0	24.2	23.1	24.9	27.2	23.6	
Boston.....	19.8	29.3	24.8	23.7	20.9	25.8	23.7	
Chicago.....	20.3	23.2	21.8	18.8	21.5	25.6	22.5	
New York.....	24.1	27.9	27.4	25.7	25.9	27.7	26.5	
Philadelphia.....	19.1	20.5	20.9	21.3	21.9	23.6	22.4	
St. Louis.....	21.1	23.4	22.0	23.0	21.8	22.5	22.6	
Canada:.....								
Quebec.....	7.8	8.3	7.8	9.0	8.1	10.0	11.1	
Ontario.....	11.4	12.4	13.1	10.8	10.9	12.7	13.9	13.0
Montreal.....	11.0	10.9	10.7	13.1	10.7	13.7	14.0	13.6
Toronto.....	12.6	14.5	15.6	13.1	12.8	15.6	15.1	15.1

spite of the many advantages of insulin, the present mortality rates of large populations appear to differ in no way from those found prior to the advent of insulin. This is shown in Table II. The latest available data are recorded. The various factors which may influence such data and the possibility that these stationary mortality rates of large populations may be more apparent than real were discussed in a previous paper¹. That the treatment of diabetes outside of hospitals is still far from ideal is suggested from the experiences with patients admitted to hospitals but who have been under treatment prior to their admissions.

By the above observations, I am not suggesting that hospital treatment is essential for the successful management of the diabetic. Were it so, it would be a very unfortunate state of affairs, since relatively few diabetics can come to hospitals. Since very few diabetics can receive hospital treatment, any method of treatment, ideal as it may be, if it can be carried out in hospital practice only, can hardly affect mortality rates. It is not the results, ideal as they may be, obtained with a few selected individuals, but the average obtained in the great majority of cases which influences mortality rates. Therefore, unless we alter these mortality rates, we must admit our failure to treat this disease properly. Such an admission would be a reflection on the profession, in view of present day facilities. I am, however, convinced that a good average result is possible in the treatment of diabetes by the practitioner in his office, or home, practice. How this average may be obtained forms the subject matter of this paper. Before, and for the purpose of this discussion, may I, firstly, present the following cases:—

CASE 1

A young man, twenty-five years of age, never known to have had any signs or symptoms of diabetes before, but with a family history of the disease, suddenly developed polyuria, thirst, loss of body weight and marked weakness. He had received no treatment, and five weeks later, when first seen by a physician, was in a state of severe acidosis, or in coma.

CASE 2

A man, forty-five years of age, known to be a diabetic, but whose urine had always been kept sugar-free, developed pneumonia, and, during the routine examination, large quantities of sugar were now found in the urine.

CASE 3

A woman, fifty-five years of age, with a history of having had gall bladder disease for four years, complained of being "very weak." The urine contained sugar and acetone bodies.

CASE 4

A man, sixty-two years of age, was brought into the hospital with dry gangrene of one of the lower extremities, and, during the course of examination, diabetes was discovered for the first time. A careful history revealed the fact that the diabetes preceded the gangrene.

CASE 5

On the other hand, another male, of the same age, also seen for the first time, was brought into the hospital, also with dry gangrene. There was marked generalized arteriosclerosis, and the history suggested that the glycosuria was secondary to an arteriosclerotic pancreas.

CASE 6

One other patient, known to have had diabetes for six years, but who had not been seen during the last two years, was admitted with moist gangrene and marked sepsis.

CASE 7

A child, a boy, eight years of age, with an apparently irrelevant previous history as regards diabetes, (no infection, injury, etc.) was seen for the first time. He was in coma. The mother stated that the child was apparently well until two weeks before, when she noticed that he was drinking large quantities of water. Two days before he came to the clinic he commenced to vomit.

CASE 8

Another child, two years of age, was also seen for the first time with a history of sugar having been found intermittently by the family physician during the previous four weeks. There were no other signs nor symptoms suggestive of diabetes.

CASE 9

A man, forty-two years of age, came with a history of having applied for a life assurance policy, and, during the course of examination, sugar was found in the urine. There were no other signs or symptoms to suggest diabetes.

CASE 10

A woman, thirty-six years of age, known to have had diabetes for the last four years, and who had been grossly careless both as to diet and insulin, and who was feeling and looking well until very recently, developed thirst, polyuria, weakness and loss of body weight. The urine now contained large quantities of both sugar and acetone bodies.

CASE 11

At a periodical examination, during her pregnancy, a woman, twenty-eight years of age, was found to have sugar in the urine. Renal glycosuria was excluded.

CASE 12

A man, thirty-eight years of age, known to have diabetes and in whom the disease had been under control, developed hyperthyroidism and, without any alterations of diet, glycosuria reappeared.

CASE 13

On the other hand, another man, of the same age, was seen for the first time and was found to have marked hyperthyroidism and glycosuria.

I have cited these few types of cases, though there are others, as they are fairly representative of the general population of a diabetic clinic. In each case, the treatment is different, the progress is different, and the prognosis is different. Some require insulin when first seen; in others, diet alone suffices. Of those requiring insulin, some may eventually be able to do without it, while others may not only have to continue its use, but, eventually, increase the amounts. The

prognosis, the chief concern of the patient, depends largely upon the management. Proper management depends upon proper diagnosis. Proper diagnosis depends very largely upon a careful history and physical examination, in other words, on clinical knowledge. The general clinical considerations in the management of the diabetic form the subject matter of this paper.

In the following outline I propose to bring before you the general plan of management of the diabetic in our clinic. Here and there, it will be noted, that certain practices are practically impossible outside of hospitals. These will be found, however, to be relatively few. How much of this plan can, or cannot, be followed in home, or office practice depends much upon conditions in the locality of the practising physician. Since these differ, I believe, in discussing this phase of the subject, that it would be more valuable to give an account of all that we do, rather than a few things which appear to be more practical from the point of view of office or home treatment. The plan, as outlined, certainly aims high in its demands, but the higher the aim the greater are the possible accomplishments.

Whether the patient is treated in the indoor or outdoor department of the hospital, the management is practically identical. Because of the economic factor, we avoid, as much as possible, admitting diabetics to our hospital wards, when there are no associated conditions to complicate, and unfavourably influence, the course of the disease. The routine we adopt is outlined in our Form 1,* and some of the different items will be referred to briefly.

HISTORY AND PHYSICAL EXAMINATION

The first consideration is a very careful history and physical examination. These are of the greatest assistance in determining the type of diabetic we are dealing with. Treatment and prognosis obviously depend upon the type. An acute diabetic receives insulin as soon as he is seen and, in the great majority of cases, is eventually able to do without it. A history of a gall-bladder disease with the exact date of its onset may suggest that the diabetes is secondary to a pancreatitis following some infection of the biliary passages. In such cases, other measures are taken to definitely prove, or disprove, the

presence of gall-bladder disease. Should gall-bladder disease be found, to treat such a diabetic by diet, or diet and insulin alone, and to disregard the progressive degeneration of the pancreas, is obviously poor practice.

A careful physical examination may detect some associated condition which is aggravating an otherwise mild diabetes. Failure to detect such a condition leads to misinterpretation of the severity of the disease and unnecessary exposure of the patient to low carbohydrate diets or to insulin and repeated needle punctures for long periods of time. For example, a mild diabetic with some focus of infection (teeth, tonsils, boils, etc.) may appear, when first seen, to be a severe case, since insulin is required. The treatment of such foci leads in the majority of cases to improvement of carbohydrate tolerance; some of such individuals who required insulin may now be able to do with smaller amounts or discontinue its use entirely; and those who did not require insulin may be able to tolerate diets of much more liberal carbohydrate content.

Careful physical examination may detect some condition other than diabetes which leads to hyperglycaemia. In such cases there is superimposed upon the hyperglycaemia of the diabetes that due to the other condition. Hyperthyroidism is a striking example. With proper treatment of the hyperthyroidism, that part of the hyperglycaemia which it has caused is controlled and one is now left with the hyperglycaemia due to the diabetes only. In such cases, also, as with infections, by the elimination of the complicating factor, individuals who were taking insulin may be able to reduce the dosages or discontinue its use entirely, and those who did not require insulin may eventually be able to tolerate diets of more liberal carbohydrate content. Numerous other examples could be cited in order to emphasize the importance of a careful history and physical examination.

The family history is of value, particularly with regard to cardiovascular disease. It is generally recognized that just as diabetes predisposes to cardiovascular disease, so does heredity. When a family history of cardiovascular disease is obtained particular effort should be made to control the diabetes, as such persons may be more susceptible to gangrene and other manifestations of cardiovascular disease than those without family histories of this complication.

*Note—The forms and pamphlet referred to in the text can be obtained from the author.

It will be noted in the above mentioned form that the patients are sent to the special clinics for examination of the teeth, ears, nose, throat, etc. This procedure is a matter of expediency because of the large number of diabetics in our clinic. Such examinations are obviously the duty of the physician in charge of the patient in general practice. This also applies to the examination of the cardiovascular system for which our patients are referred to the heart clinic.

While on the subject of physical examination, a digression about the keeping of records may not be entirely out of place. One fault commonly met with in medical records is the failure to report negative findings. These are important, particularly from the point of view of subsequent studies. Diabetes is still imperfectly understood. An important function of a large clinic is to accumulate data with regard to every possible phenomenon observed. For example, in studying the relationship between tonsillar infection and the progress of the diabetic, unless the condition of the tonsils is mentioned, one cannot, at a later date, tell whether the tonsils were, or were not, diseased or whether they were overlooked in the examination. With no record, one would have to assume that the tonsils were never examined, and this case, though it may be otherwise valuable, is lost. In order to overcome this as much as possible, a statistical history form (Form 2) is made use of in our clinic. In addition to this, a cross index system is maintained. It is, thus, possible at any time to obtain data of all our patients about any particular phase of the disease in a very short time. With a proper cross index system, the time factor in such studies ordinarily expressed in terms of many months may be reduced to days, and in many cases to hours. I mention the statistical consideration in the management of the diabetic because it applies to the practitioner, as well as to hospitals. A clinical diagnosis is a statistical conclusion. It is based upon a series of observations and the application of probabilities. The value of clinical observations made in home or office practice should differ in no way from that made in hospitals. It might here be mentioned that one of the best examples of what the general practitioner can do with regard to clinical statistics is the work of the late Sir James Mackenzie on heart disease.

As far as we have discussed the routine man-

agement it will be seen that no one procedure is as yet confined to hospital practice. We now come to the consideration of certain examinations some of which require specialized technique. On the whole, however, it will be seen that very many of these examinations are still applicable to general practice.

X-RAY EXAMINATION OF THE FEET FOR CALCIFICATION OF ARTERIES

This special examination is made particularly for the prevention of gangrene. Here, again, however, there are many clinical considerations. Particular attention should be paid to the individual who has had diabetes for a number of years, and also to elderly diabetics. Gangrene, it would appear, is not related to the severity of the diabetes but to the length of time the disease has not been under control. The readiness with which gangrene develops appears also to be related to the time of life at which the diabetes developed. In our clinic it has been noted that when the disease developed between the ages of 30 and 40 years the average time before the onset of gangrene was 9.4 years; whereas, when the disease developed after the age of 70 years, the average time before the occurrence of gangrene was less than one year.

Complaints of pain of the lower extremities require careful analysis. The complaint should not be dismissed lightly with the idea that one is dealing with a diabetic neuritis. Diabetics, it is true, are very liable to neuritis, but there is a marked similarity between the symptoms of sciatica and early gangrene. Pain extending to the toes, coming on suddenly, and at times causing limping, should arouse suspicion. Special enquiry should be made as to whether attacks of pallor or bluish-red discolouration occur in the same limb. These attacks suggest gangrene. This applies, particularly, if, on examination, the foot is found to be pale and cold and at other times congested. The diagnosis of early gangrene is probably correct if the pulse in the posterior tibial artery is obliterated and almost certain if there is no pulsation in the popliteal artery. Some patients, however, notwithstanding that they may appear to have good circulation, are susceptible to gangrene of the extremities more than others. In spite of exclusion of arteriosclerosis by careful clinical examination, in spite of the finding of good pulsation in the dorsalis pedis, posterior tibial and popliteal arteries, roentgenological examination may detect

calcification of the walls of the vessels. Proper treatment of this condition, will, in the majority of cases, prevent gangrene. It may here, however, be stated that by careful clinical examination, one can detect arteriosclerosis in the majority of cases. Having detected its presence, the procedure which is to follow is greatly clinical and applicable to general practice. A brief digression of our method of handling these cases may not be out of place.

When any sign, subjective or objective, suggestive of diabetic gangrene is discovered (coldness, fatigue of the muscles of the legs on slight exertion, absence of pulsation of any of the blood vessels, etc.) our patients are immediately referred to the Physiotherapy Department, and the following treatment is given:

During the first month the patient attends the Department three times a week. At each visit, the muscles of the legs are massaged and the patient receives ultra-violet rays (general exposure). Toe exercises are taught and the patient is instructed to repeat them three times daily. Bicycle exercises for each leg are also given. Buerger's exercises are taught and the patient is instructed to repeat these also at least three times daily, that is, before rising in the morning, at mid-day and before retiring at night.

Because of our experiences with this routine it is my opinion that of all the measures mentioned Buerger's exercises give the best results, when carried out faithfully and regularly. Since it is the most practical of all methods and can be carried out in general practice, it is described in detail here, though, it has been described repeatedly elsewhere. The following is taken verbatim from Joslin's Third Edition of the Treatment of Diabetes:

The affected limb is elevated with the patient lying in bed, to from 60 degrees or 90 degrees above the horizontal, being allowed to rest upon a support for thirty seconds to three minutes, the period of time being the minimum amount necessary to produce blanching or ischaemia. As soon as blanching is established, the patient allows the foot to hang down over the edge of the bed for from two or five minutes, until reactionary hyperaemia or rubor sets in, the total period of time being about one minute longer than that necessary to establish a good red colour. The limb is then placed in the horizontal position for about three to five minutes, during which time an electric heating pad or hot water bag is applied, care being taken to prevent the occurrence of a burn. The placing of the limb in these three successive positions constitutes a cycle, the duration of which is usually from six to ten minutes. These cycles are repeated over a period of about one hour, some six to seven cycles constituting a sance.

The length of time of its application may, in some cases, depend upon the pain which may be induced by

elevation of the foot. In some cases the symptoms may necessitate a diminution in the period of elevation.

It cannot be too strongly stressed that failure of this form of treatment is, in the great majority of cases, the result of not carrying out the exercises with the proper care, frequency, and regularity.

In addition to the above, the following advice is given:

Cold baths should not be taken. At night, after Buerger's exercises are done, it is advisable to have a warm foot bath. The water should be sufficiently warm to make the skin of the feet and legs acquire a pink colour. During the cold weather, a hot water bottle should be applied to the feet at night. Special care must be taken not to have the bottle too hot.

This may cause blisters which may lead to gangrene. Read very carefully the "Rules for the Prevention of Gangrene" issued in the Diabetic Clinic.

X-RAY OF THE CHEST FOR TUBERCULOSIS

As is well known, diabetics appear to be more susceptible to tuberculosis than normal individuals. My impression is that this relationship should not hold as much in the future as it has in the past. The susceptibility to tuberculosis in the past, was, probably, due to the lowered resistance of the diabetic, because of his nutritional state. Diabetics, properly treated, with or without insulin, should have a normal nutrition. In spite, however, of the best efforts, a large number of patients will not rigidly adhere to their diets. This results in persistent hyperglycaemia, which is a good indication of active diabetes. Such individuals, more than others, are susceptible to all sorts of infections, including tuberculosis. As a routine, therefore, all diabetics, besides the usual physical examination, have their chests examined by x-ray every six months.

X-RAY OF THE GALL-BLADDER

About twenty-five per cent of all adult diabetics appear to have diabetes secondary to gall-bladder disease. It is now possible, in the majority of cases, to detect gall-bladder disease, in the absence of clinical signs and symptoms, and, probably, one of the best tests is visualization of the bladder wall with the aid of phenol-tetra-iodophthalein.

LABORATORY DATA

It is only after a careful history has been taken and a complete physical examination has been

made that laboratory data are sought. These consist of the following:

Urinalysis.—The first examination is, obviously, the test for sugar. The test which should follow invariably is that for acetone bodies. It is remarkable how often one hears that the urine has been tested for sugar but acetone bodies have not been sought for. Information with regard to the latter test is most important, when, in the interpretation of the results, due consideration is given to the clinical pictures. Acetone bodies may indicate severe diabetes and suggest urgent measures; on the other hand, they may have been accidentally produced, either by starvation or by some alteration of the diet by the physician or the patient.

Examination for albumin and casts may lead to the detection of a chronic nephritis which may account for an otherwise unexplainable unsatisfactory course. Because of the chronic nephritis there has resulted a raised renal threshold for sugar. Under these conditions, the absence of sugar in the urine ceases to be an index of progress. The blood sugar examination is essential here. This examination is also, at times, important, from the point of view of the severity of the diabetes, in that albumin and casts are almost invariably found in the early stages of diabetic coma. Microscopic examination of the urine may also lead to the discovery of other lesions of the kidney, surgical, etc., which, with proper care, may be improved and this in turn may lead to a reduction of the severity of the diabetes.

Chemical Examination of the Blood.—Information with regard to the blood sugar is extremely valuable. If it is not possible to perform this test in all cases, particular effort should be made to obtain the information in certain types of patients. Occasionally one meets with a diabetic whose urine is sugar free but who actually has active diabetes as indicated by a high blood sugar, that is, the individual has a raised renal threshold. Clinically, such raised renal thresholds should be suspected in chronic nephritis, in diabetes of long duration, with histories of gross dietary indiscretions, in infections and arteriosclerosis. It may also be found in juvenile diabetics who are taking large amounts of insulin.

Cholesterol determinations demand much more elaborate technique, and such determinations, at least at present, are confined to hospital

laboratories. For the value of this test I may refer to a recently published article².

COMA

In a discussion of the clinical aspects of diabetes, one cannot close without a brief reference to coma. In the diagnosis, and in the management, of this serious complication, the clinical consideration of the patient is, by far, the most important, compared with laboratory tests. The degree of coma, whether the individual is merely drowsy or semi-conscious, is a valuable guide for the dosage and mode of administration (subcutaneous or intravenous) of insulin. The colour of the skin gives some idea of the condition. The bright red healthy colour of the skin, its warmth and dryness in the early stages, stand out in striking contrast to the cold, moist and cyanotic skin in the last stages when heart failure is beginning to play its part and when cardiac and respiratory stimulants are indicated. With regard to these stimulants information concerning the pulse and blood pressure is, obviously, also of value. The respirations in uncomplicated coma, are, as is well known, characteristic. The condition of the eyes, particularly the tension of the eyeballs, is of much diagnostic significance. So far as the writer is aware, there is no other form of coma associated with a soft eyeball. The condition of the tongue with its dryness, beef-like colour and the sand-paper-like sensation it yields on palpation, is characteristic and the diagnostic value of the acetone odour to the breath need hardly be emphasized. With a knowledge of all these clinical phenomena, the blood and urinary findings are of secondary importance. In order not to miss any of the above clinical details, we have, in our clinic, a routine diabetic coma sheet, upon which, during the course of the coma, the house physician may make hourly clinical notes.

My remarks may have appeared to be rather general and fragmentary. They are confined to general considerations rather than to the diagnosis and detailed treatment of any particular type of diabetic, of which the literature is full. My purpose is to emphasize the important part that careful examination of the patient plays in the management of diabetes. The urine of practically any diabetic can be made sugar-free, either by diet alone, or by diet with insulin, in a very short time. The important thing is to keep it free. Success and the patient's future, however, depend very much upon the treat-

ment of the various conditions referred to. The treatment of these conditions obviously depends upon the recognition of them, and this, in turn, depends upon a careful history and physical

examination and not only upon *simple urinalysis* or estimation of blood sugar.

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FUNDUS MANIFESTATIONS IN METABOLIC DISEASES*

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THE changes occurring in the fundus oculi have a distinct value in the diagnosis and prognosis of certain diseases. To the neurologist fundus examination is of course invaluable, but to those working in the field of general medicine the ability to recognize five fundi is of particular importance. The first, of course, is the normal fundus; the second, the arteriosclerotic fundus; the third, the diabetic fundus; the fourth, the nephritic fundus; and, last, the fundus of malignant hypertension. Naturally, it is desirable to be able to differentiate these pictures one from another and also from other diseases of the eye. Of greatest importance, however, is the ability to recognize that the fundus is abnormal or unusual, thereby recognizing the necessity for calling on a trained ophthalmologist for assistance. Important as it is, I do not intend to describe the normal fundus but merely to notice some of the abnormalities as they occur in these cases. Among these I have placed the arteriosclerotic fundus first, since it is the simplest and is also encountered in its various forms in other conditions.

Many of us are apt to be discouraged with our slow progress in ophthalmoscopy. With modern instruments the difficulty is not so much due to technique as to the supposed dearth of suitable patients. In point of fact there is no dearth, The more fundi of normal individuals one can examine the better is one prepared to recognize the abnormal fundus. As to the abnormal, they are not less frequent here than elsewhere in the world and diligent search for them brings its reward. A careful and complete examination of the retina can scarcely be made without dilatation of the pupil with a mydriatic. Particularly in the aged with short anterior chambers, the danger of subsequent glaucoma should be avoided by in-

stilling a drop of one-half per cent eserin solution in the conjunctival sac after examination.

Text-books usually describe first the optic disc. In this group of cases the disc or papilla is of lesser importance than some other structures in the fundus, such as the vessels. By direct ophthalmoscopy the fundus is magnified some fifteen times, and by moving slightly, if necessary, a vessel comes into view. These vessels are similarly magnified so that we have here an opportunity of observing comparatively small vessels, vessels much smaller than any we can palpate, and at the same time much nearer to the actual distributors of nutrition to the body cells, the capillary vessels. As Moore has pointed out, these vessels are not normally subject to the high pressures or to the large variations in pressure that obtain in other larger vessels. The blood flow is more continuous than rhythmic, and pulsation is noted only under exceptional circumstances. The retinal vessels are located in the inner, cerebral, or nerve fibre layer of the retina. Veins are about one and one-half times the diameter of the accompanying arteries, appear somewhat less cylindrical than arteries, are darker in colour and rarely possess as marked a light streak unless abnormal. In the albinotic or in the tessellated fundus indications of choroidal blood vessels are seen in the form of red flat ribbons extending apparently without pattern across the field. It is impossible to differentiate the choroidal artery from the choroidal vein.

Tracing the retinal vessels toward the disc there may be several features worthy of note in arteriosclerosis. It is sometimes thought that tortuosity is one of the most important of these, but, as a matter of fact, the large individual variations in tortuosity of normal vessels make the diagnosis somewhat difficult. When, in an edematous retina, the vessels are seen to weave into and out of focus by assuming different

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depths in the inner retinal layer as well as a distinctly tortuous course over the fundus, and also when the macular arteries are seen to pursue a course resembling a corkscrew, tortuosity may be diagnosed by the least experienced, but much experience is necessary to identify the less pronounced cases of tortuosity.

The size of the vessels is of considerable importance in differentiating various fundus conditions. In simple arteriosclerosis the size of the veins is not changed from normal, nor is the size of the artery consistently changed. In speaking of the size of the vessel, however, it must be remembered that the normal vessel is perfectly transparent and therefore invisible. What we really see is the size of the blood column. When, however, a thickening of the intima occurs it is usually somewhat patchy in character and this is shown by a contraction of the blood column alternating with regions where its width is normal. This is characteristic of an *intimal* sclerosis of considerable severity. The light streak on the artery is normally about one-fourth the width of the artery. With the development of a *medial* sclerosis this becomes wider and assumes a burnished copper appearance and sometimes appears to be finely beaded. Considerable care must be exercised in the interpretation of this sign, as it is only an exaggeration of the normal and is somewhat dependent on the amount and quality of the light used, but, when well marked, it may be regarded as definitely pathological. In essential hypertension it is only seen in the severe or late stage of the disease. Distinct perivasculitis is seldom seen in the simple arteriosclerotic fundus.

Some of the most important signs of vascular sclerosis are to be found where arteries and veins cross. Often the vein is faintly visible through the normal artery wall, and it is, of course, visible right up to the artery wall. In arteriosclerosis the vein becomes invisible for some little distance from the arterial blood column due to the increase in the thickness of the artery wall. Accompanying the more severe degrees of arterial change there is also a distinct change in direction of the vein as it is crossed by the artery. While the usual course of the vessels may make acute angles at the crossing, one sometimes sees the vein turn sharply to pass under (or over) the artery at a right angle, then turn back to continue the original direction.

Tracing down the vessels one comes upon the papilla. Careful examination of the papilla

should be made for colour, the condition of its margin, the level, and the vessels. In simple arteriosclerosis, apart from the changes which may occur in the vessels, there is slight if any abnormality of the papilla. Four principal arteries with the accompanying veins pass out from the papilla and each of these should be examined in turn for the foregoing evidences of vascular sclerosis. In addition, the sector of the retina through which the vessel courses should be searched for other abnormal findings, such as edema or white areas, and particularly the macular region should be examined for a macular star—partial or complete. These appearances should not be present in the simple arteriosclerotic fundus, nor are haemorrhages, though frequently present, a necessary feature of this condition. They seem more likely to be present if high blood pressure accompanies the arteriosclerosis and are commonly superficial and flame shaped, though round punctate haemorrhages in the deeper layers of the retina also occur. Chorioretinitis is sometimes seen in simple arteriosclerosis, though it also accompanies syphilis, tuberculosis and nephritis. Pigmentation and depigmentation, alone or intermingled with white areas representing complete sclerosis of the vessels of the choroid, or white areas with red ribbons representing their partial sclerosis, are to be found in the fundus deep to the retinal vessels. In arteriosclerosis the macular and the peripapillary area are most frequently affected, but the degree of injury is seldom as great as with syphilis or even nephritis.

I have described, at some length, the characteristic features of the simple arteriosclerotic fundus. These features are found in varying degree in the fundi to be later described, or in other words the peculiarities of these fundi are usually engrafted on a basis of arteriosclerosis or raised blood pressure, or both. Diabetics frequently have ocular abnormalities, many of them more interesting than the fundus changes, but these cannot be discussed here. The fundus changes of diabetics never occur in the young and have no relation to severity, and the diabetes is of some considerable duration when they become recognizable. It is equally true, however, that diabetes of long standing may be present without any alterations in the fundus other than those of simple arteriosclerosis.

While the diabetic fundus has some points of resemblance to that of other conditions certain points are rather distinctive. Fine, rounded, yellowish-white solid masses with sharp edges,

sometimes confluent, may occur between papilla and macula and surrounding the macula. Haemorrhage and hypertension are absent. The disc is normal. There is never a macular star. In cases of greater severity haemorrhages of varying size appear, and in the most severe cases a retinal exudate and papilloedema are present, which is difficult to differentiate from those of renal injury, since raised blood pressure and albuminuria are also present at this stage. The earlier degrees are susceptible to dietetic and insulin treatment. The more severe degrees are not, though I am not prepared to agree with Grafe that they constitute a contra-indication to insulin treatment of a diabetic patient.

The picture in diabetic lipaemia is an unusual and exceedingly characteristic one. The eye-ground as a whole is pale as in an anaemia, but the blood vessels are unique. The artery and vein are the same colour and this colour is creamy white at the vessel margins, particularly in the periphery of the fundus, with an increasing amount of red tint toward the midline of the vessel. As the fat appears to collect along the vessel wall and even to infiltrate it, one continues to find the sign present when drawn blood no longer shows evidence of lipaemia macroscopically. Approximately six per cent of fat must be present in blood before the lipaemic fundus is recognizable as such. No changes appear in the disc. The condition occurs only in the young and only during diabetic acidosis or coma. The administration of insulin rapidly abolishes all evidence of lipaemia and the lipaemic fundus soon returns to normal. The sweet odour of acetone, or other signs of acidosis, invariably accompany the lipaemic fundus and there is little if any danger of confusion with the retinitis of leukæmia, which differs also in showing papillary and peripapillary oedema, haemorrhages, and often broad white lines alongside the vessels.

It has been previously indicated that the fundus lesions of renal disease are associated with evidences of arteriosclerosis. While this is in the main true certain qualifications should be noted. In degenerative kidney lesions or nephroses no fundus changes are found. The focal nephritides, such as may be encountered in subacute bacterial endocarditis, puerperal infections, etc., sometimes show a few white areas of degeneration and haemorrhages, usually with a white centre. In not more than ten per cent of cases of acute diffuse glomerulonephritis a papilloedema and retinitis, with cotton wool exudates and haemor-

rhages, may occur in the retina. These heal completely. Chorioretinitis and the macular star are absent. In the subchronic stage of nephritis (parenchymatous nephritis) seldom are eye-ground changes seen unless the blood pressure is unusually high. Haemorrhages, a retinal oedema, and rarely a papilloedema may occur.

The fundus changes in the nephritis of pregnancy may be particularly severe and often permanent. They are similar to the changes seen in acute glomerulonephritis but, as a rule, more extensive. The arteries are often contracted and a neuritic atrophy may follow. The grade of oedema may be so great as to produce a detachment of the retina, and chorioretinitis with pigmentation may occur. The prognosis in retinal detachment in these cases as opposed to that occurring in rare cases of acute glomerulonephritis is not wholly bad. Re-attachment is sometimes seen, but if this does not occur soon further degenerative changes are inevitable and vision may be much reduced, especially if the macular area is involved. Therapeutic abortion or induction of premature labour must be carefully considered. Since the retinitis usually occurs in the later months of pregnancy a viable child is to be expected. If early fundus changes only are present these may be favourably influenced by such procedures, but late changes are not. Other eye diseases, especially the fundus changes of a chronic nephritis, are unfavourably influenced by pregnancy, and therapeutic abortion is indicated not only from the ocular but also from the renal standpoint. As to the likelihood of recurrence of retinitis in subsequent pregnancies opinion is divided. It now seems probable from recent evidence that the renal injury will recur in perhaps seven out of ten cases and in some of these fundus changes may be expected to develop. Such patients should be advised against pregnancy.

In chronic glomerulonephritis the development of retinal changes is of evil omen, indicating as it usually does death within one to two years. Many have thought that the retinal vascular sclerosis in chronic nephritis is secondary to the retinitis. This is, however, wholly contrary to the history of renal disease, and from a pathological standpoint must be regarded as improbable. There can be little doubt, however, that the advance is rapid following the development of a retinitis. Due to the associated anaemia, the disc, as well as the fundus generally, is pale. Papilloedema is rare; cotton wool exudates are

rare; but dense white snow banks may surround the disc and appear elsewhere in the fundus. Absorption of these takes place leaving fine white dots in the retina which, in the macular region tend to arrange themselves in a star-shaped or fan-like manner. Flame-shaped haemorrhages occur in the nerve fibre layer, and exudate and haemorrhages in the deeper layers of the retina, and later varying degrees of chorioretinitis with exudates, pigmentation and depigmentation appear. With such changes in the fundus an advanced degree of renal insufficiency is present. Indeed, it would appear that renal insufficiency is an essential feature in the development of this picture, since it also appears in the late stages of the subacute progressive form where vascular changes are not so marked but renal insufficiency is an outstanding feature of the patient's condition.

Closely allied to the fundus changes of chronic nephritis are those described by Keith and Wagener in malignant hypertension, or by Foster Moore as arteriosclerotic retinitis, and from the renal viewpoint by Volhard and Fahr in the so-called 'combination form' of arteriosclerosis plus nephritis. Keith's work, however, goes to show that the injury is more widespread than a vasculo-renal disease and that such patients may suffer more from the cerebral and cardiac complications than the renal element. Proof that a patient with a typical fundus has a satisfactory renal function is not to be taken as indicating a good prognosis as such patients usually die in a relatively short time of other causes—cerebral or cardiac failure—or, more typically, of a simultaneous failure of all three. In the fundi the arteries are strongly contracted; arteriosclerosis is always a prominent feature; the retinitis consists at first of a papillary hyperæmia and mild œdema with a few peripapillary cotton wool exudates and haemorrhages. Intimal sclerosis is rare. With greater severity the area of the serous peripapillary œdema extends outwards involving the macula. Exudates are still of the cotton wool variety. Later, the hyperæmia of the disc fades, the œdematosus area recedes from the periphery,

punctate exudates appear, and a fine macular star develops. Vascular sclerosis becomes more marked; perivasculitis appears, denoted by the silver wire artery and the white lines beside the blood column of both artery and vein. In the last stage secondary optic atrophy, macular star, punctate exudates, a few haemorrhages, and marked retinal arteriosclerosis and chorioretinitis are present. Vision is, of course, reduced. This final stage is seldom observed, as the patients usually die in the preceding stages. This picture differs from that of chronic nephritis in the contraction of the arteries, the degree of sclerosis, the well-marked hyperæmia of the disc and the papillœdema, and the absence of the peripapillary snowbanks of nephritis, together with the clinical evidence obtained from the history and physical examination of the patient.

Few other metabolic diseases show characteristic fundus changes. In hyperthyroidism pulsation of the retinal arteries at a distance from the papilla occurs. Aortic regurgitation, intracranial or intraocular tumour, and glaucoma must be excluded. As the sign is not constant and is only present in well-marked cases of the disease it is seldom used. Coupled with an arterial flash seen extending to the finger-tips on their transillumination, it is, in the absence of aortic regurgitation, as highly diagnostic as the estimation of the basal metabolic rate, though it cannot be used in a quantitative manner.

A question may be asked: Are these fundus changes diagnostic? Can one by this means recognize the disease causing the injury? The answer is: sometimes; with increasing skill, more often. It should be pointed out, however, that we seldom make a diagnosis on a single observation, and the recognition of these abnormalities in the fundus should initiate an investigation calculated to uncover their cause. When this is discovered the state of the fundus gives useful information and no mean help in many instances as to the probable outcome of the case, not alone from the standpoint of the ophthalmologist but also from that of the internist.

METALLIC INTRA-OCULAR FOREIGN BODIES NOT DEMONSTRABLE ON ROENTGENOGRAMS.—In one of two cases reported on by N. M. Black and F. Herbert Haessler, Milwaukee, in which an intra-ocular foreign body of iron was not demonstrable on an entirely satisfactory roentgenogram, the foreign body remained in the iris for a year. The mass of tissue that formed about it was diagnosed as a neoplasm since the Wasser-

mann and tuberculin reactions were negative and because they assumed that foreign body had been reliably ruled out by the roentgen examination. A fragment of iron longer than 1 mm. was found in the piece of iris tissue removed, and subsequently a wound of entrance through the cornea was demonstrable.—*J. Am. M. Ass.* 93: Oct. 5, 1929.

THE TREATMENT OF CEREBRO-SPINAL SYPHILIS AT THE VERDUN PROTESTANT HOSPITAL*

A REVIEW OF SIX YEARS' WORK WITH SPECIAL REFERENCE TO PRE-HOSPITAL CASES

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ACTIVE treatment of cases of cerebro-spinal lues began in this hospital in May, 1923. An examination of the records of our cases previous to that time would give ample warrant for altering Dante's famous line to read: "Abandon ye all hope whose nervous system harbours the spirochæte"! Even the remissions frequently mentioned by various writers seldom took place in patients whose mental symptoms were severe enough to cause their being placed with us. Of 330 patients suffering from some form of cerebro-spinal lues admitted from July, 1890, to May, 1923, only 37 have in their case reports the notation, "slightly improved". Only one is shown as discharged, "recovered". The rest all show a record of early or late death in the hospital.

From, May, 1923, to May, 1925, we used tryparsamide and mercury, treating a series of 41 patients.¹ Four months ago we published a report on this group. There were 10 at that time who had been discharged some three or four years previously, who were still outside and going on very well; 14 more were living, but demented; 17 were dead. To-day these figures should read—9 going on satisfactorily outside; 12 still living, but demented; 19, dead. In other words, two of the chronic demented class have died, and one of the ten, who to all appearances had made a fairly satisfactory remission since July 21, 1924, was on April 12, 1929, readmitted to the hospital, apprehensive, depressed, and confused. The spinal fluid showed strongly positive tests.

In May, 1925, we began active treatment with malaria, and the present paper presents a brief review of our first series of 40 cases. All the patients in this series had their treatment completed before October, 1927. In May, 1928, we reported in this *Journal*² that 16 of this

original group had been discharged for periods varying from six months to two years and ten months. Now, thirteen months later, we find that they are all still carrying on outside. This means that 16 general paretics have been out and engaged in their former occupations for from 19 months to 3 years and 11 months. The majority we have seen during the past year, and the charts will show their present and past serological condition where we were able to secure it. There are some observations which have repeatedly forced themselves upon us during the last six years, and I wish briefly to refer to several of the more important.

Treatment with malaria, either alone or followed with a course of tryparsamide, is much superior to tryparsamide alone, for several reasons. First, the period of time required for complete treatment of the patient is greatly shortened. The average length of treatment under tryparsamide was a year or more, as given either in our institution or in the outdoor department. The mental and physical restoration, when it did come, was a slow and gradual affair. In some cases we cannot help feeling that hopeless mental and physical degeneration overtook the patient before tryparsamide alone had been able to arrest the paretic process, whatever that paretic process may be. Secondly, when tryparsamide only is used the drug must be pushed considerably in order to secure results. We found when this was done that the number who exhibited beginning optic atrophy was, to say the least, disconcerting. The actual figures were 25 per cent. We ceased treatment when it began and it is significant that all those whose treatment was stopped for this reason either died or progressed to a state of chronic dementia. Some of these we felt would have been saved by malaria treatment. Again with malaria and subsequent tryparsamide treatment the incidence of optic atrophy is greatly decreased. We had

* Read before the Psychiatric Section of the Canadian Medical Association, at Montreal, June 20, 1929.

only two cases of optic atrophy develop among our post-malarial series and this occurred after a very intensive and prolonged course of tryparsamide; to be exact, 40 to 45 three gram doses. Our peace of mind during post-malarial tryparsamide treatment has been greatly increased. During the period from 1923 to 1925 we were constantly examining fundi, constantly ascertaining fields of vision, constantly using eye charts. We still make use of these precautions, but after treatment with malaria they become much more routine in nature.

Our third and best reason for advocating treatment with malaria is a statistical one. Under tryparsamide, only 10 out of 41 secured satisfactory remissions and one of these has already come back to us with a recrudescence of the disease (about 25 per cent). Under malaria with subsequent tryparsamide, 16 out of 40 similar patients achieved satisfactory remissions, or exactly 40 per cent. A reference to the charts will, I think, convince you that the serological picture was also much more quickly and positively altered for the better by malaria than it was by tryparsamide.

We do, however, consider that tryparsamide has an important though secondary place in the therapy of cerebro-spinal lues. Patients often come to us in a greatly weakened physical state. There is no doubt that a short course of tryparsamide will enable some of these at least to undergo the treatment by malaria, but truth compels us to add that in every case in which we felt it necessary to adopt this procedure the patient either died before we felt justified in giving him malaria, or if he did improve improve enough physically to withstand fever therapy the result was chronic dementia.

In common with all other workers we have found that in this treatment the malarial attack is very easy to stop. We usually give $7\frac{1}{2}$ grains of quinine-urea hydrochloride intravenously and follow with quinine sulphate, 10 grains three times a day for three days and 5 grains three times a day for the next four days. In our first series of 40 cases we had no recurrences of fever; in the last two years, however, we have had three cases in which apparently typical malarial chills recurred, in one case three months after the fever had been terminated. The organisms could not be demonstrated, but a course of

quinine stopped the attack, and it has not come back.

We do not screen our patients and have never had a cross infection in the ward. Both in this connection and also with regard to the ease with which the malarial attack is stopped, it must be remembered that we are dealing with an organism in which the malarial life cycle has been seriously modified. The mosquito stage has been absent for a great many generations. Gametocytes are absent; also the number of plasmodia is relatively small and they do not stain as easily as in the ordinarily transmitted forms. Certain it is, that in Vienna it was found impossible to transmit this type of malaria, even by the use of Anopheles.

We have had two individuals whom we found impossible to inoculate successfully, in spite of provocative measures. To make the infection take in one other, however, a provocative dose of "dmeicos" was given. This was after we had abandoned hope of the inoculation taking. The patient had quite a severe chill from the effect of the dmeicos, and then on the following day she experienced a typical malarial paroxysm and continued through an uninterrupted course of twelve.

In the original series of 40 cases we had 8 deaths during or soon after the malarial chills. These eight patients were all in very poor physical condition and five were 55 years of age or over. The common cause of death was exhaustion with a terminal broncho-pneumonia.

During the last year we have abstained from inoculating this type of patient, and in consequence have had no deaths chargeable to malaria. In every instance, however, the patients whom we conservatively refrained from inoculating died while we were endeavouring to build them up with tryparsamide, and the one or two who did improve enough to receive malaria with safety are still hopelessly demented and will probably always be residents of a hospital. In view, however, of the further fact that we previously had secured several surprising recoveries under malaria in patients quite old and in very poor physical condition, it is a question in my mind whether our present conservative attitude is not taking from some patients a chance of recovery; that is to say, in dealing with this terrible disease we must remember we have nothing to lose and everything to gain by

at least making an effort toward its control.

We usually give tryparsamide immediately on terminating malaria, and continue with 3 grams a week for 12 to 15 weeks. To this weekly dose of tryparsamide we also add one grain of bismuth, but never salvarsan or mercury.

This leads me to make some reference to the use of salvarsan and mercury in general paresis. The records of our hospital bring out one fact strongly, *viz.*, that a considerable percentage of our very worst cases have a history of intensive treatment with these drugs. It is outside the scope of this paper to enter the present controversy as to the value of these drugs. We simply say that once the nervous system has been invaded by syphilis, this hospital does not use either of these drugs as a treatment, much less a cure.

We have used typhoid vaccine instead of malaria in three cases. We found the chills were very much harder on the patient, undoubtedly more exhausting, and the results so far as the reduction of the serological findings were concerned were not as good; moreover, no patient appeared to be improved mentally by them.

In making a prognosis, both the age and type of patient must be taken into account. In none of our cases under 35 years of age have we secured much success with either malaria or tryparsamide. In most, the treatment seemed of little avail, and the disease progressed to its inevitable fatal termination. It is worthy of note that the period of incubation in all these cases was very much shorter than the average 15 years, but again discussion on this point would take us beyond the bounds of this paper, and would lead into vague speculation on the true nature of the paretic process. Men advanced in years, we find, are poor risks, while patients of the confused, demented, or paranoid hallucinated types, may have an apparent arrest of the disease, but with no restoration of the mentality.

As regards sex, the number of women patients has been small, but the percentage of satisfactory remissions has been more than equal to that of men, in spite of some reports now appearing tending to show that women respond less favourably than men.

A person about the age of 40 to 50 years, previously untreated, exhibiting the so-called classic picture of "G.P.I." that is, delusions of grandeur, slurring speech, etc., will almost in-

variably, if taken early before his physical and mental condition becomes deteriorated, show dramatic improvement from malaria therapy.

After all, *early treatment*, before this dread disease has wrought damage to both mind and body, is the great object to be aimed at. It was the realization of this fact which led us in 1927 to apply malaria therapy to a few patients before they had time to develop mental symptoms. It might be claimed that some of these cases would never develop insanity. Our reply is, "Who knows?" Short of the typical post-luetic tabetic, who, it is said, very seldom becomes demented, he would be a very rash physician who would say to a patient suffering from an early attack of cerebro-spinal lues, "You will never become insane". But granted for a moment that mental trouble does not develop, there are other sequelæ of neurological syphilis which are almost as much to be dreaded as general paresis. The number of cases of this type which we have had the opportunity to treat is necessarily limited, as neither the family physician nor the patient feels like invoking the assistance of an "asylum" or its doctors before mental symptoms render it absolutely necessary. We have, therefore, a series of only 18 cases to present. These 18 all showed various types of neuro-syphilis, ranging from frankly paretic forms through the cerebro-spinal and meningitic down to the typical post-luetic tabetic. While we humbly confess our inability to distinguish always between these forms (and not so humbly declare that we think no one else can) we are positive that every one of the 18 suffered from some form of neuro-syphilis. Besides ourselves, every case was seen by one, and most of them by two competent physicians; in every one the diagnosis from the serological and clinical signs was unanimous. Nearly all these patients have been treated one to two years ago. Out of the 18, two are dead; malaria, it is true, hastened their death. It is as undoubtedly true that both would have become insane and died, as both were showing mental symptoms and both were in poor physical condition. One was killed in a street car accident after recovering from his malaria; this was entirely accidental and not dependent in any degree on his physical or mental state.

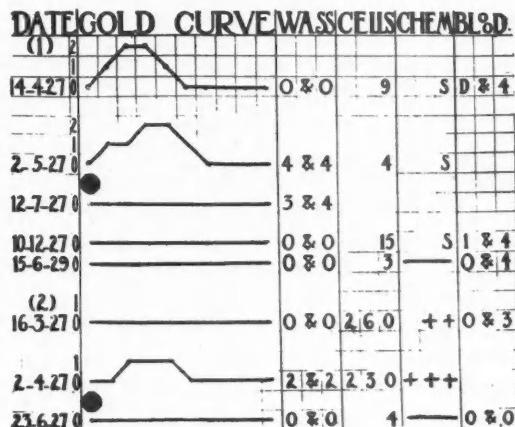
Charts of the serological condition of the remaining 15 are presented. It will be noted that all the records, are, unfortunately, not complete

in their serological details, but we, or their family physicians, have seen all the patients recently. In nearly every case in which they are complete, however, it is striking to see how the serological findings in these comparatively early cases have improved.

Two points must here be noted. These cases comprising all types of neuro-syphilis, which, compared to the average patients admitted to an asylum must be regarded as in an early stage, but from the standpoint of a genito-urinary or neurological clinic would be considered as well developed and in many cases hopeless material, have shown as a group far more marked improvement than is ever obtained in the case of patients who had progressed to a stage which rendered their commitment to an asylum inevitable. Therefore it would appear probable that had these patients been treated with malaria when the involvement of the nervous system first became evident, instead of this treatment being delayed till very marked disability occurred, the patients would have been saved much expense, loss of time, and suffering, and their present average condition as a group would have been better than it is now.

The second point is this; the serological improvement is after all of minor importance. The physical condition of the patients is the chief consideration and in all of these, it can be emphatically stated that the clinical improvement is if anything more marked than the serological. The one clinical feature which presents some exceptions to this statement is the existence of severe tabetic pains in their various forms; these are very obstinate and hard to relieve. However, I am stating the facts conservatively when I say that the pains have been relieved in all cases, and in the majority greatly relieved. As far as the other symptoms were concerned we must remember that we have here a group of 15 men and women, most of them with a history of intensive salvarsan and mercury treatment. They were all incapacitated from carrying on active life and were facing a very dark future. To-day they are performing their daily tasks and justifiably meet the problems of life with much more confidence.

In the charts the black dot immediately to the right of the date column indicates where intervention by malaria took place. Owing to lack of space only cases Nos. 1, 2, 3, 4, 5, 6, 7 and 8 are shown.



CHARTS OF CASES 1 AND 2

CASE 1

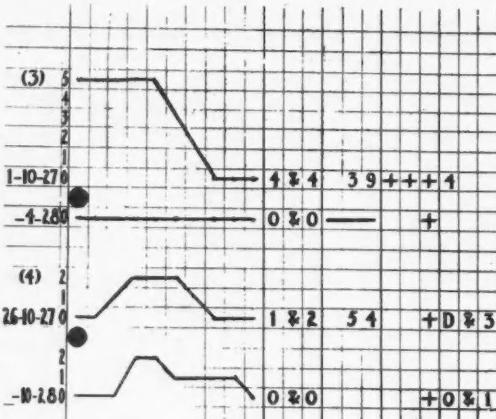
A woman, aged 39 years. This patient might be expected to show the least satisfactory results for she suffered from a typical post luetic intense girdle sensation, very severe crises, marked Rombergism, and Argyll-Robertson pupils. She had a marked tabetic gait, "wool" sensation in the soles of her feet, marked bladder and rectal symptoms, but no mental symptoms. She had had intensive treatment with salvarsan and mercury for one year and was referred to us by her family physician as he was afraid of his patient becoming helpless. (The second serological examination shows the effect of a provocative dose of tryparsamide). We were rather reluctant to give malaria in this case as the outlook did not appear very promising. The patient however was insistent and malaria was given during May and June, 1927. The result was a marked diminution of her crises. She has been able to do her own housework and assist her husband in his business. When last seen she said her pains were getting fewer and less severe.

CASE 2

A male, aged 53 years, clerk, with a history of ten years' anti-luetic treatment; one year's incontinence of urine and feces. He could not wash his face for the last year unless propped up in a corner. When seen, the patient was in bed complaining of intense supraorbital pain. The legs were markedly spastic, with bilateral Babinsky sign, marked clonus, and absent abdominal reflexes; increased knee reflexes. The pupils were equal and reactive. No mental symptoms. Malaria was given during April and May, 1927. Both the serological and the clinical improvement was striking. The supraorbital pain, incontinence, increased knee jerks and Babinsky sign have all disappeared. The patient has felt well, has worked hard as a freight clerk, and has gained weight ever since.

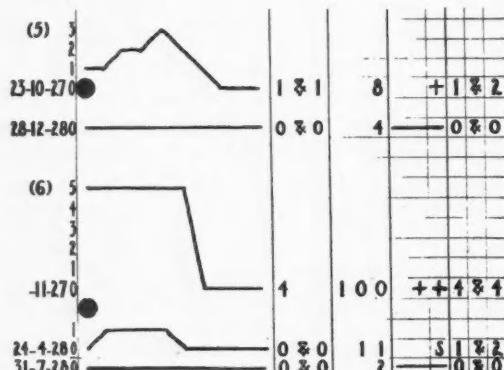
CASE 3

Male, aged 48 years, farmer. A history of anti-luetic treatment for some twenty-years, also marked loss of weight and strength for the last year. The patient was seen in the local hospital, complaining of intense supraorbital pain, absent abdominal reflexes, and lessened knee jerks. Other reflexes were normal. Malaria was given in October, 1927. He has gained in weight and strength, and works on his farm. His physician considers him to be doing very well.



CASE 4

Male, aged 60 years. A history of 30 years anti-luetic treatment, including the Swift-Ellis methods. Marked loss in weight, aortitis, marked unsteadiness on feet, intense crises; a history of fainting spells. In spite of his age and poor condition the patient insisted that he be given malaria, which was done in November, 1927. He withstood it well. The crises have disappeared, but he occasionally feels some lightning pains in his right heel. He has gained in weight and strength and has ever since followed his previous occupation. We must remember however that this man's vascular system is deeply involved and this, combined with his age, may lead to serious results. We feel confident however that he will not die of neuro-syphilis.



not heard from her since the end of 1928 when she was reported to be well and doing her housework as usual.

CASE 10

A woman, a housewife, was seen in consultation with the family physician. The physical signs were marked; mental lethargy; poor physical condition. She was given malaria in August, 1928. She is at present reported by her physician as well and doing her own work.

CASE 11

A male, aged 48 years, seen by the local neurologist in September, 1928. He presented squint, double vision, left ptosis, double Babinski sign, Argyll-Robertson pupils, recent weakness of limbs, and one year's history of delay in micturition and impotence; no mental symptoms whatever. He received malaria in October. The result on the serological findings is shown, and his physician reports "great improvement, vision normal, no weakness of any kind, working steadily at business."

CASE 12

A male, aged 50 years, had received a long course of tryparsamide and mercury in local clinic. In May, 1928, he presented marked optic atrophy, with distinct impairment of vision, loss of weight, and the ordinary physical signs of cerebro-spinal syphilis were marked. He was unable to work, and there were already slight mental signs. Malaria was given in May and June. The results of two punctures, one taken immediately after, and the other one year after, are shown. The patient has improved physically and mentally. The field of vision is increased, the optic atrophy is at least no worse, and he has worked steadily for the past year.

CASE 13

A male, aged 38 years, was seen during July, 1927. He gave a history of long treatment with salvarsan and mercury. Distinct optic atrophy was present, also girdle sensation, lightning pains, and bladder symptoms. There were no patellar reflexes; Romberg's sign was present and considerable ataxia. The pupils reacted poorly to light. The patient was utterly unable to work. No mental signs. He was given malaria in July, 1927, and was discharged improved. He disappeared from our observation for two years, but the result of a puncture done July 10, 1928, is shown. At that time he had no lightning pains, less girdle sensation, less ataxia, improved bladder function, and had been working for some time.

CASE 14

A male, aged 40 years. His serological condition on June 29, 1927, is shown. At that time he was depressed, irritable, tremulous, his speech was slurring, the legs, spastic; a right Oppenheim sign was present, and he had Argyll-Robertson pupils. He was utterly unable to work. He was given malaria in June and July, 1927, and, like Case 13, he disappeared from view until March 7, 1929, at which time he was able to work and his general symptoms were much improved.

CASE 15

A male, who presented himself to a local neurologist in October, 1928, showing loss of knee jerks, Argyll-Robertson pupils; speech and ideation were sluggish, and mentally there was a suggestion of general paresis. His physical condition was poor. He was given malaria immediately, and in February was reported on by his physician as already showing marked improvement in speech, ideation, and physical

condition. The serological aspects were still unimproved.

Before concluding this paper let me put before you a few personal thoughts as to why non-specific therapy succeeds when specific treatment has so signally failed. We doctors are prone to forget the fact that almost never do we cure a disease with drugs; at the most, we relieve symptoms. The *vis medicatrix naturae* is what we depend on to cure disease. We give rest, we arrange diet, we combat symptoms merely to give time to allow this force to accomplish the cure. Wagner-Jauregg recognized this fact as early as 1888-1889, when he undertook the first researches in non-specific therapy for syphilis, ranging from erysipelas, tuberculosis, typhoid, sodium nucleinate, and, finally, in 1917, to malaria.

One may say that tryparsamide is a specific drug, but we must remember that even with a full dose the arsenical content of tryparsamide is very small; also that arsenic in small doses is still recognized as one of our best tonic drugs. We have found good nursing, nourishing food, fresh air and sunlight just as valuable in treating cerebro-spinal lues as they are in any other chronic infection. At any rate, whatever may be the underlying factors which induced the beneficial effect, it is certain that the course of our patients during recovery was not such as to lead us to believe that the improvement was due in any large degree to specific action. In both our tryparsamide and our combined malaria and tryparsamide series the relief of symptoms which took place was subsequent to the physical betterment of the patients. They first began to gain strength, to increase in weight, and to show a more normal appetite. In watching their recovery one was strongly reminded of the way in which the body recovers from any wasting disease. The whole picture during convalescence seemed to be due to a marshalling of the resistive forces of the body rather than to a direct spirocheticidal action of drug treatment or therapy with the malarial organism.

SUMMARY

1. Before the introduction of tryparsamide in 1923 practically all patients admitted to this hospital suffering from cerebro-spinal lues progressed to a fatal termination.
2. Of 41 patients treated with tryparsamide

and mercury from May 1923, to May 1925, 9 are still going on satisfactorily outside.

3. Of 40 patients treated by means of malaria followed by tryparsamide and bismuth, 16 are still carrying on outside.

4. Malaria followed by tryparsamide is a much more adequate treatment than tryparsamide alone, for three reasons: (a) It is much quicker, and in some cases at least it forestalls hopeless degeneration; (b) the danger of optic atrophy is much less; (c) a much higher percentage of patients secured satisfactory remissions under malaria than under tryparsamide alone.

5. The use of tryparsamide alone, to the exclusion of malaria, is to be deplored, but it has distinct value when used subsequently to fever therapy. It may possibly be of value when the patient's physical condition is clearly such that malarial inoculation would be fatal.

6. Induced malaria is easy to stop, and is not infective.

7. In our series the improvement among women was if anything better than that among men.

8. In view of the poor results of other forms of treatments we feel that we cannot lightly undertake the responsibility of refusing to inoculate a patient with malaria, even on the grounds of a poor physical condition.

9. We have treated a small series of cases before pronounced mental symptoms set in. Our results in this group have been much more striking than those obtained among our asylum population. These results have been indeed so marked that we feel that no patient suffering from any form of neuro-syphilis should be allowed to progress to an asylum before malaria is tried. The success in typical cases of post-luetic tabes is not so gratifying as it is in the other types, but it is greater, especially in relieving pain, than any other forms of treatment we are aware of.

10. We feel that non-specific therapy succeeds not so much because of a direct spirochaeticidal action but because it enlists and stimulates the natural resistive forces of the patient, in other words, the same means whereby any infection is overcome. The value of good nursing, good food, fresh air, and sunlight must not be lost sight of in this connection.

From the clinic at the Verdun Protestant Hospital.

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EYE EXAMINATION OF SCHOOL CHILDREN.—Frank H. Robin discusses methods of examination of the eyes of school children. He says that there is a marked discrepancy in the percentages of defective vision found in the examination of school children by various observers. There is no definite standard of what to consider defective vision in children examined in the schools. The examination of the eyes is often done under unfavourable surroundings and by unqualified persons. The nurse's room should be so arranged that vision can be taken under uniform conditions. The following standard is recommended: Children attending kindergarten and the first five grades, while standing on the 15 foot line, should be able to read the 20 foot line on the chart with the better eye, and the 30 foot line, or better, with the other eye. Vision below that is to be considered defective. For children of the upper grades this standard is suggested: While standing at the 18 foot line they should be able to

read the 20 foot line on the chart with the better eye, and the 30 foot line, or better, with the second eye. In testing the vision of 15,267 children in San Francisco, Rodin found that 12 per cent had eye defects. Children with marked defective vision should be referred to the special sight-saving classes. The eye examination should be done by the medical school inspector along with the routine physical inspection. The importance of the routine eye examination in the schools cannot be overemphasized.—*J. Am. M. Ass.* **93:** 911, Sept. 21, 1929.

"Experimental science has three great prerogatives over other sciences; it verifies conclusions by direct experiment; it discovers truth which they never otherwise would reach; it investigates the course of nature and opens to us a knowledge of the past and of the future."—Roger Bacon,

THE TREATMENT OF PNEUMONIA FROM THE POINT OF VIEW OF THE CIRCULATION*

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ONE of the commonest, as well as one of the most fatal, diseases we are called upon to treat is acute pneumonia. Recent records of this hospital show that of 279 cases of pneumonia, 70 died, giving a mortality of a trifle under 25 per cent. This result compares not unfavourably with what is usually obtained in general hospitals.

If we ask ourselves the question as to what it is that kills these patients, some of us will put the blame on the heart, others on the vasomotor system; some will say the cause of death is sepsis, while others will point to respiratory failure. Whether or not we agree with those investigators who hold that the commonest cause of death in pneumonia is cardiovascular failure, we must all agree that failure of some part of the circulatory system is an important factor, often leading to a fatal outcome in many of these patients. At least, everybody will admit that the condition of the circulation must always be of definite and serious concern to the physician. It seems profitable, therefore, to inquire into the nature and the extent of the damage usually suffered by the cardiovascular apparatus in pneumonia, and, having obtained as clear a picture of the pathology as is possible with our present knowledge, to consider how we may best treat our patients, particularly from the standpoint of the circulation.

The treatment of pneumonia is still far from satisfactory, in spite of the volume of very valuable experimental research of recent years. Indeed, the assiduous search for a specific cure has only demonstrated how complex the disease really is. The work of such investigators as Dochez,¹ Avery,² Cole,³ Cecil,^{4, 5, 6} and others has taught us to look upon pneumonia not as one disease, but as a complex group of biologically different infections. That is why

previous efforts to produce a specific treatment proved unsuccessful. In spite, however, of the progress made during the last fifteen years, we have to admit, as Cecil himself frankly does, that "much more still remains to be done before a thoroughly satisfactory specific is achieved." Furthermore, it is important to realize that, even with serum at its best, we could not possibly expect to obtain such brilliant results as we get from specific therapy in diphtheria, for pneumonia often attacks middle-aged or elderly people, and particularly those who are suffering from some systemic disease or who are alcoholic.

The problem of pneumonia, therefore, still remains. If a large proportion of pneumonic patients recover, it is not because we have discovered a potent cure, specific or non-specific, but because the disease is fortunately self-limiting. The physician is the determining factor in but a small percentage of recoveries. As Professor Hay,⁷ of Liverpool, points out with truth, "In 100 cases the chances are that about 75 will survive if allowed to do so; 10 to 15 will probably die—doomed from the first. This leaves another 10 to 15 patients whose chances of recovery will depend on the manner in which the case is handled." We shall, therefore, still have need to treat our pneumonic patients individually and symptomatically, and continue to adopt such measures as are calculated to forestall signs of danger.

To attempt to safeguard the integrity of the heart or the peripheral circulation, and to do it intelligently, it is important to obtain some clear ideas about the response of the cardiovascular system to this acute infection. Unfortunately, this is not easy. The mechanism of the failure of the circulation in pneumonia is not yet well understood, for it is no easy matter to give a clear or precise account of the pathology of the circulation. Unlike some of the other infectious fevers, pneumonia produces no definite anatomical changes in the heart. In

* From the Heart Clinic, St. Boniface Hospital, Winnipeg; read at the monthly clinical meeting, Feb. 14, 1929.

typhoid fever, for example, we often find focal necrosis in the myocardium, and in diphtheria we can make out some fatty degeneration and round-celled infiltration. In rheumatic fever also, and in syphilis, we can see infiltrating inflammatory invasions. Not so in pneumonia. Romberg, in some classic experiments on animals, as long as thirty years ago, was struck by the absence of any important changes in the heart in pneumococcal infections, and Aschoff, later, was also unable to find any specific pathological process or parenchymatous change in the myocardium. Since, therefore, anatomical lesions in the pneumonic heart are, according to the majority of competent investigators, infrequent and relatively insignificant, there must be some functional impairment of the heart or of the peripheral circulation to account for the failure of the circulation that admittedly occurs in pneumonia. Although we still have no direct method for estimating myocardial function, we know that there are certain factors in pneumonia that must throw an extra burden on the heart.

It is obvious, in the first place, that the pathological changes in the lung must be held responsible for some impairment in the pulmonary circulation. Kline and Winternitz⁸ made a study of the pulmonary circulation in experimental pneumonia, by employing the method of vital staining, and were able to demonstrate marked impairment. Later, Gross,⁹ of Montreal, made a radiographic study of barium-injected lungs from patients dying of pneumonia. He found that in the areas showing grey hepatisation, the vessels could scarcely be injected at all, and only the large branches appeared patent. Even these were compressed, and ended abruptly. Such was the lack of injection that the whole area appeared strikingly anaemic. This was not so marked in those parts showing red hepatisation, although there also spaces could be seen where the vessels were not injected, and even those showing injection were narrowed and compressed. On the other hand, the healthy parts showed vessels and capillaries excessively dilated, the capillaries having acquired a calibre two or three times the normal, and the whole lobe presented a striking picture of compensatory arterial dilatation. (See Figure).

Taking these facts into consideration, we may

infer that, in order to overcome the gradually increasing resistance to the circulation through the pulmonary vessels, the right ventricle will be forced to contract with greater and greater force. That this inference is correct has been demonstrated by examining pressure curves recorded from the right ventricle. Failure of the right heart will therefore be more likely to develop where there is extensive involvement of the lung or in previously existing mitral or pulmonary disease. This failure may be recognized



X-ray photograph of barium injected lung from a case of lobar pneumonia showing impairment of pulmonary circulation (after Gross).

by such signs as venous distension, cyanosis, pulmonary oedema, enlargement of the liver, weakening of the second pulmonary sound, and by dilatation of the right heart, as seen by x-ray or as found by careful percussion. But the importance attached by the older clinicians to failure of the right heart as the cause of death in pneumonia seems to have been exaggerated, for signs of this do not often appear even in lobar pneumonia.

The disturbance to the respiratory function caused by the pulmonary lesion is responsible, however, for throwing a much more serious burden on the heart. The early alveolar inflammation, and the subsequent alveolar exudation, seriously interfere with the proper aeration of the blood, with the result that the blood

circulating through the lungs is unable to pick up its normal quota of oxygen. Since, therefore, each unit of blood can take up only an insufficient amount of oxygen, more units of blood will have to pass through the lungs in a given period of time, that is, if the tissues are to be supplied with sufficient oxygen, and failure of tissue metabolism is to be prevented. Thus, in order to compensate for imperfect respiratory function in pneumonia, the heart will be forced to increase its output.

Although this compensatory increase in cardiac output is of undoubted benefit to the organism, the heart must suffer from the extra strain. Hence, if it is able to hold out until the defensive forces of the body are able to overcome the infection, recovery will take place. If, however, the increased burden thrown on the heart is too much for it, cardiac exhaustion will occur, and death may ensue. That is why circulatory failure is more common in pneumonia than in typhoid or acute miliary tuberculosis, although the degree of toxæmia is probably of the same order of intensity. That is also why pneumonia is more fatal if it attacks patients already suffering from some cardiovascular lesion, whether valvular, myocardial, or arterial, because the diseased heart has already exhausted at least part of its reserve force, and if driven to increase its output must break down more readily.

The disturbance to the respiratory function may be so marked, however, that even a healthy heart, with all its increased output, will not be able to compensate for the defective oxygenation of the blood. There will, therefore, result some arterial anoxæmia. Thus, in his experiments on arterial unsaturation, Stadie^{10, 11} found that, whereas in normal individuals the arterial blood is saturated with oxygen to the extent of 95 per cent, leaving an unsaturation of only 5 per cent, in pneumonia the unsaturation often reaches 20 per cent or even more. Now we know from the reports of the Anglo-American expedition to the Peruvian Andes that sudden transition from the sea-level to those high altitudes produced a variety of severe symptoms, because the oxygen unsaturation of the arterial blood reached 10 per cent. In pneumonia it is often more than that. Further, if a normal individual is exposed in an atmospheric chamber to an oxygen pressure

which has been so reduced as to produce a degree of arterial unsaturation such as we often find in pneumonia, he develops headache, weakness, vertigo, tachycardia, palpitation, praecordial pain, shortness of breath, disturbances of vision and hearing, with delusions, delirium, and Cheyne-Stokes breathing. It becomes possible, therefore, to ascribe some of the worst symptoms of pneumonia to anoxæmia, and to see how this adds a serious burden to a patient already suffering from the effects of the local pulmonary lesion, such as thoracic pain, cough, expectoration and fever.

It is of interest to note that anoxæmia is more likely to be pronounced in the earlier than in the later stages of pneumonia. For, early in the course of the disease, before hepatisation has developed and obliterated the alveolar capillaries, the usual quantity of blood is still able to pass through them. The alveoli, however, being inflamed, there is interference with proper gaseous exchange, and the blood flowing through such an affected area is imperfectly aerated. This portion of blood will, therefore, remain more or less venous in character, i.e., poor in oxygen and rich in carbon dioxide, and, on entering the general arterial circulation, will pollute it. Later, with the development of consolidation, the circulation in the alveolar capillaries gets diminished or abolished, and, since little or no pollution thus occurs, the arterial blood is less unsaturated than before. Hence, as pointed out by Meakins and Davies,¹² the degree of cyanosis, which is proportional to the amount of oxygen deficiency, becomes less marked as consolidation increases. Hence, also, cyanosis is more common in bronchopneumonia, where consolidation is never so complete. As, moreover, this disease usually begins with a bronchiolitis, the terminal bronchioles get blocked very early, with the result that, while the alveoli are imperfectly aerated, the alveolar capillaries remain patent and conduct the usual quantity of venous blood. Pollution is therefore favoured.

It is important to realize the significance of anoxæmia in pneumonia, because it plays a leading part in bringing about cardiovascular and respiratory failure. In the early phases of the disease it is associated with a retention of carbon dioxide, and enhances the effects of this excess. As CO₂ normally acts as a stimulant

to the vital medullary centres, and anoxæmia exaggerates this stimulation, the result will be exhaustion of those centres, with respiratory failure, dyspnoea and cyanosis. In the later phases, when consolidation has become established, there is much less retention of carbon dioxide. On the contrary, the rapid and shallow type of breathing, so characteristic of pneumonia, produces a deficiency not only of oxygen but also of carbon dioxide, which is pumped out of the blood and the tissues. This reduction of carbon dioxide, the "acapnia" of Henderson¹³ and others, especially in the presence of oxygen deficiency, is responsible for a very dangerous condition. For, owing to the deficiency of carbon dioxide in the blood, the respiratory and vasomotor centres are insufficiently stimulated, with the result that the blood pressure falls and respiration becomes progressively weaker. This type of respiratory failure is different from the other, and more insidious, for it is not accompanied by dyspnoea. The cyanosis will also be different, for, instead of the blue or purple colour usually associated with excess of carbon dioxide in the capillaries of the skin, we get the pallid or ashen-gray type of cyanosis due to the lack of carbon dioxide in the superficial capillaries. Death in the later stages of pneumonia may, therefore, be heralded by a type of respiratory failure unassociated with the usual air-hunger, and by a type of cyanosis without the usual blueness. These are more treacherous than the common types of cyanosis and respiratory failure. Thus we see that the anoxæmia produces a dangerous state of affairs, for not only may it force the heart to increase its work beyond its capacity, especially as its blood supply is also polluted, but by accentuating the effects of either too much or too little carbon dioxide, it may bring about failure of respiration and of vasomotor control.

The effects of toxæmia on the heart seem to have been exaggerated, for it is very doubtful if heart failure in pneumonia results from toxic myocarditis. Thus, Newburgh and Porter¹⁴ found that the heart muscle from dogs dying of pneumonia contracted just as long and as forcibly as that from healthy dogs if both were perfused with normal healthy blood. Yet, on reversing this experiment and using pneumonic blood as a perfusate, the healthy heart muscle

contracted less than 50 per cent of the normal and even less than the pneumonic. This illustrates the fact that, although the bad effects of toxæmia on the healthy heart must be considerable yet in a patient suffering from pneumonia the heart gradually adapts itself, with remarkable success, to the progressive increase of toxins in the blood. Apparently, the pneumonic heart gradually achieves a relative immunity to the toxins. There is, therefore, no ground for assuming, as many people still do, that heart-failure occurs in pneumonia because of the direct action of the toxins on the myocardium.

The pernicious results of toxæmia fall, however, with greater severity on the central nervous system, and exert a weakening and paralyzing effect particularly on the vasomotor centre. This loss of vasomotor tone weakens the control of the abdominal vessels by the splanchnic nerves, and ultimately paralyses the peripheral circulation. The blood collects and stagnates in the relaxed vessels of the great splanchnic territory, and the general arterial blood-pressure falls. As, therefore, the heart receives only a fraction of the blood essential for its efficient contraction, the intra-cardiac pressure falls, and failure of the heart occurs secondarily to failure of the peripheral circulation. This is analogous to what occurs in surgical shock and in collapse.

It is, therefore, no exaggeration to say that in few other diseases do adverse conditions so conspire to defeat the functions of the circulation as in pneumonia. The strain on the right heart resulting from impairment of the pulmonary circulation, the widespread pernicious effects of anoxæmia on the whole cardiovascular system, and the weakening of the peripheral circulation caused by the toxæmia, not to mention other factors not so well understood, all conspire to hit the circulatory apparatus in so many vital points that no wonder it often becomes exhausted and finally breaks down under the combined attack.

With these ideas clear in mind as a pathological basis, showing how the heart reacts, and how pneumonia tends to exhaust the whole cardiovascular system, we shall be better equipped to review the various therapeutic measures most commonly employed, and estimate their value in preventing or repairing damage to the circulation. If we possessed a

really effective specific cure which could sterilize the blood, neutralize toxins, and cut short the disease before circulatory exhaustion occurred, the problem would be fairly simple. An effective biological specific cure is, however, still in the experimental stage. In the meantime, we must summon to our aid those measures we have, and use these with understanding and discrimination.

In the absence of an effective specific cure, some clinicians adopt remedies of a non-specific character. There is a large choice of these, from nucleinate of soda¹⁵ and permanganate of potash,^{16, 17} to electargol and diathermy.^{18, 19} Many believe they thereby achieve therapeutic "short-cuts." It is true that, like most non-specific measures, these sometimes produce some general benefit, particularly in cases with a poor marrow response and clinical leucopenia, or in delayed resolution. But the present state of our knowledge is such that it is not wise to put too much trust in any form of specific or non-specific medication. Pneumonia is a disease where meddlesome fussiness only exhausts the patient and does much harm. It is, therefore, better not to attempt to do too much.

Those who have subjected a pneumonia patient to the usual routine medical examination, and noticed how even that is enough to exhaust him, will realize the supreme importance of complete physical and mental rest. All disturbing influences like pain, insomnia, and the atmosphere of dread and apprehension often caused by loving but too anxious relatives, must therefore be minimized. An opiate, an injection of morphine, or Dover's powder, administered in the early days of the disease, when pain is acute and distressing during the day and is followed by restlessness and insomnia during the night, is a wise measure and will do no harm, so long as there are no indications of excessive secretion in the air passages. Not only does it bring rest and freedom from pain and over-anxiety, but it often deepens respiration and improves the quality of the pulse. Morphine is, indeed, such an excellent cardiac sedative that an attempt has even been made to account for its beneficial action by calling it a "heart tonic." It should be withheld, however, in the presence of undue secretion or abdominal distension, and, in any case,

opiates should be replaced by milder sedatives after the fourth day of the disease.

The condition of the abdomen is of great importance in pneumonia, for if we allow the heart, overburdened as it is by the pathological changes in the lungs, to be further hampered by distension of the abdomen, we are not giving it a fighting chance. Indeed, in patients with old-standing mitral disease, or in those with emphysematous chests, abdominal distension becomes a grave complication. If the diet has consisted, as it should, of milk and water with some cereal decoction, and strained fruit juices with perhaps some glucose, and yet the abdomen shows signs of distension, the diet should be immediately reduced to water and orangeade, a simple enema given, and, if necessary, a rectal tube inserted for removing flatus. These measures will usually be effective, but if not an intramuscular injection of pituitrin, 0.5 to 1 c.c., should be given.

With regard to the use of digitalis, there is still no uniformity of opinion with respect to its value as a routine measure in all cases of pneumonia, although it was first recommended for this disease as long ago as 1799. Even for those cases associated with old-standing heart-disease, there was, until recently, a sharp difference of opinion as to the exhibition of digitalis. On the one hand, there was British opinion represented by MacKenzie and Brunton, who held it to be of no value whatever. Sir James MacKenzie,²⁰ for example, said explicitly, "I have never seen much good follow the administration of digitalis in acute febrile states." German opinion, on the other hand, was more favourable, and Romberg²¹ insisted on the importance of giving digitalis from the outset to all cardiac patients who developed pneumonia.

After much experimental work, the consensus of opinion now is that digitalis acts as well in the presence of fever as in non-febrile states. Thus, Cohn and Jamieson²² found that, if given by mouth in pneumonia, digitalis produced a lengthening of the P-R interval and a depression in the T wave of the electro-cardiogram, just as it did in the non-febrile heart. The dose and the time required to produce those changes were the same. It is, therefore, agreed by everybody nowadays that digitalis is indicated in those cases of pneumonia that are associated with auricular fibrillation or conges-

tive heart failure. As, however, these occur but seldom in the course of pneumonia, the question still remains whether there is any valid reason for giving digitalis in the presence of a normal rhythm and in the absence of such signs as peripheral oedema, hepatic congestion or venous engorgement. On this question opinion is still divided. Thus, one writer sums up his advice in one sentence. "Leave the heart alone if it is doing its work, that is," he says, "if there is no oedema and no engorgement of the veins." The tacit assumption of this writer is, apparently, that so long as there is no oedema or engorgement, the heart is doing its work efficiently. This, however, cannot be true. A man may for a long time show no oedema or engorgement, and yet may have definite organic heart disease with but a limited cardiac reserve. A patient suffering from angina pectoris seldom shows signs of congestive failure, and yet he may be in danger of sudden cardiac death. It is true that in pneumonia there are usually no signs of congestive failure, and yet all is not well either with the heart or with the general circulation. For, as we have seen, not only is the heart called upon to do more than its normal quota of work, especially on a polluted blood-supply, but whenever vaso-motor tone falls, it loses even that support which it is entitled to get from an efficient head of pressure maintained normally by the peripheral circulation.

The opinion is sometimes expressed, even by some clinicians of distinction, that digitalis is of benefit only in cases of irregular tachycardia, such as is found in auricular fibrillation, or in cases of flutter, and that if it does not slow the pulse, it can be of no use. Clinical experience, however, proves that apart from its depressing effect on the junctional tissues, digitalis must have some direct beneficial effect on the muscle of the heart. For it can clear up oedema and congestion and ascites, even where the rhythm is normal, and without slowing the pulse. And this diuretic action of digitalis, contrary to that of caffeine, is not due to its action on the kidneys, but results from the beneficial influence exerted on the heart muscle, which is thus enabled to drive the dropsical fluid with greater force to the kidneys. By virtue of its direct action on the myocardium, digitalis increases its contractility. The muscle fibres thus shorten and

contract more efficiently, produce more complete emptying and less residual blood in the cardiac chambers, and, therefore, expel an increased quantity of blood per unit of time. In short, by increasing the contraction, digitalis increases the efficiency of the heart. Although we have no method for measuring the strength of cardiac contraction, yet it has recently been demonstrated, by means of moving x-ray pictures, that digitalis produces a distinct increase in the extent of ventricular excursion, not only in auricular fibrillation but also in the presence of a normal rhythm. For this reason, digitalis ought to be of benefit in pneumonia also. By enabling the ventricles to empty themselves more efficiently, and thus preventing the accumulation of residual blood, it should prevent dilatation, which is the preliminary to heart failure. As a matter of fact, Levy²³ succeeded in demonstrating that in pneumonia there is, indeed, a tendency to cardiac dilatation, and that this tendency is demonstrably restrained by digitalis. As dilatation means encroaching on cardiac reserve, we may logically say that digitalis conserves the reserve energy of the heart in pneumonia. Another and more obvious advantage in giving digitalis is that, should fibrillation or flutter or dropsy supervene, the heart is already partly digitalised, a fact that may be responsible for saving the patient's life.

While, therefore, it is universally agreed that digitalis should be given in pneumonia to those who have old-standing cardiac disease, or even to elderly patients with vascular disease, there is reason for the exhibition of digitalis as a routine measure to all cases of pneumonia. In order, however, to avoid subjecting a pneumatic patient to the toxic effects of over-digitalisation, 45 to 60 minims of the tincture, or the corresponding dose of the powdered leaf, should be given daily until the fifth day, and then the amount reduced to 30 minims per day, while watching for and avoiding the usual toxic effects of the drug.

Oxygen is often given in pneumonia. It is frequently administered just before death, when it exerts a remarkable moral influence, not indeed on the patient, but on his friends and relatives, who are now convinced that everything possible has been done, and that nothing in human power can now save the doomed sufferer. Since the war, however, we have been realizing

more and more the meaning of anoxæmia, and hence the significance of oxygen deficiency in pneumonia. This has led to the introduction of more adequate methods of administering oxygen, and, as the result of many reliable reports of its effective use, we have been forming a decidedly more favourable opinion of it than in the past.

It was Professor Haldane,^{24, 25} of Oxford, who, during the war, first showed how to administer oxygen with effect in the treatment of acute pulmonary œdema due to war-gas poisoning. Stadie, Meakins, and others proved that the degree of arterial oxygen deficiency corresponded to the degree of cyanosis, and that both could be easily regulated by the administration of oxygen in sufficient dosage. We are now, indeed, beginning to look upon oxygen as a drug, and, like all drugs, it has a minimum dose, a maximum dose, and an optimum dose. Since ordinary inspired air contains about 21 per cent of the gas, it is agreed by all investigators that the old-fashioned method of administering it by means of a funnel is quite useless. Even if given at the rate of 2 litres per minute, the proportion of oxygen in the nasopharynx reaches barely 24 per cent. The administration of oxygen cannot, indeed, be considered a therapeutic measure, unless the inspired air contains anything from 30 to 60 per cent, and 40 to 50 per cent seems to be the optimum dose in the average case.

The nasal catheter method of administration, first introduced by Captain Stokes for cases of war-gas poisoning, is satisfactory in mild cases of cyanosis, because at the rate of two litres per minute the percentage of oxygen in the nasopharynx may reach 30 per cent or even a little higher. For more severe cases, however, a higher concentration is essential, and this can be attained best by means of an oxygen chamber similar to that at the Rockefeller, the Presbyterian, or the Rochester hospitals, or by means of a portable tent, such as the one described by Barach.²⁶ With the aid of Barach's apparatus, which has the advantage of being simple, cheap and portable, it is possible to get a concentration of 40 per cent even with one litre per minute. Barach²⁷ found this concentration sufficient to clear up cyanosis, relieve dyspnoea, diminish restlessness, lessen any tendency to delirium, and promote sleep. Further, Boothby and Haines²⁸ were able to demonstrate that

oxygen produced even a fall of temperature. It is, indeed, the conviction of some investigators that, in severe cases of pneumonia with marked cyanosis, the administration of oxygen is a life-saving procedure. There can be no doubt, however, that its effective administration in adequate dosage is supportive, and tends to prolong life until such time as the mechanism of immunity is able to gather sufficient force to accomplish recovery. Stadie has shown that cyanosis of the finger-nails and lips that can just be detected, corresponds approximately to 10 per cent oxygen unsaturation; definite cyanosis corresponds to about 15 per cent; and marked cyanosis to about 20 per cent, or more. It is well to bear these figures in mind as rough but useful clinical estimates, as they enable us to adapt the dosage of oxygen to the degree of cyanosis.

A few words must now be said about the so-called cardiac stimulants, — drugs, namely, that are commonly employed in acute circulatory emergencies. There is a vast volume of experimental research and clinical investigation recorded about the action of these drugs, but the evidence is often both conflicting and confusing. This is due to the fact that, not infrequently, what is diagnosed as acute cardiac failure is, strictly speaking, not due primarily to the heart at all, but is secondary to failure of the peripheral circulation. Since modern research is attaching more and more importance to the peripheral circulation, we shall have to learn to differentiate more strictly between cardiac failure and vascular failure. This is not merely a matter of academic interest, but has a direct bearing on practical treatment.

With regard to the use of cardiac stimulants in pneumonia, it is well to remember that, if heart failure occurs, it does so primarily not because the myocardium has been poisoned or weakened by the toxæmia, but because of over-work and exhaustion due to the increased load. In that case, it is questionable whether it is good treatment to endeavour to stimulate the heart to still further and more exhausting efforts. It is not often wise to whip a tired horse. As a matter of fact, however, some of the drugs often classed as stimulants really act as cardiac sedatives, and prevent over-compensation, which is responsible for cardiac exhaustion in pneumonia. Even digitalis, the supreme cardiac stimulant, owes some of its

most beneficial action to the fact that, by depressing conductivity, it lowers the ventricular rate and prevents exhaustion of the ventricles. It has even been demonstrated that, in certain cases of heart failure, digitalis reduces the cardiac output. Hence its sedative, as well as its tonic influence, must be borne in mind. Similarly, the administration of oxygen, by reducing anoxæmia, also reduces the necessity for the increased cardiac output; while one of the reasons for giving morphine in the early stages of pneumonia is because it also acts as a cardiac sedative.

We may now consider the following six drugs, as representing the commonest of the so-called stimulants often employed with the object of supporting an acutely failing circulation. They are alcohol, strychnine, adrenalin, pituitrin, caffeine and camphor.

Alcohol, the most favoured of these, is commonly regarded, not only by the general public but also by many general practitioners, as the cardiac stimulant par excellence. It is the common belief that alcohol possesses some unexplained specific power in stimulating the heart. So far, however, we have no scientific evidence to prove that it can stimulate the heart in any degree. On the contrary, there is some evidence that the presence of alcohol in the blood inhibits the vital processes which are responsible for the production of antibodies. Hence, many of the more scientific clinicians believe that to give, under the guise of a cardiac stimulant, large and repeated doses of a depressing drug like alcohol, which on absorption, moreover, tends to interfere with the immunizing process upon which recovery from pneumonia depends, cannot be sound treatment. We know, of course, that a small amount of concentrated alcohol, like brandy or whiskey, will revive a patient in fainting. Some momentary improvement in the circulation undoubtedly occurs, but this improvement follows so soon after administration that it is not possibly be ascribed to absorption. It can only be accounted for by assuming a reflex stimulation of the medullary centres. After absorption, however, alcohol undoubtedly causes some redistribution of the blood, which is manifested by flushing. The flow of blood through the skin seems to be increased at the expense of that in the internal organs. In virtue of this

action we might suppose it could be of some use in an ordinary chill. Here, it might act beneficially by overcoming the sudden reflex constriction of the vessels of the mucous membranes of the nose and throat that follows upon sudden cooling of the surface of the body. But even in this case its action is not stimulating but sedative. As a matter of fact, as Cushny²⁹ points out, "The action which lends alcohol its value in therapeutics is not its stimulant but its narcotic action." As a sedative, alcohol has its uses. It may be comforting during the initial phase of pneumonia when given in hot drink during the rigor. As a sedative it may also be of benefit, when given either alone or combined with hypnotics, in procuring rest and sleep for an over-excited and nervous patient suffering from pain and insomnia. There is, further, no objection on therapeutic grounds if dilute alcohol, in the form of wine, for example, is ordered during the stage of convalescence. But the administration of fairly large and repeated doses of strong alcohol, with the avowed object of preventing or counteracting failure of the heart, seems to be unscientific, and may do harm by hampering the production of immunity, which is after all the sole curative agency in pneumonia.

Strychnine used to be, and often still is, a favourite cardiac stimulant. It has been demonstrated, however, by Parkinson and Rowlands,³⁰ among others, that it exercises no specific action on the heart. Even as a respiratory stimulant it is unsatisfactory in pneumonia, for it increases the rate of breathing at the expense of the depth.

There is more reason for the use of adrenalin. When the blood-pressure falls and the heart sounds grow feeble, as not infrequently happens in pneumonia, the injection of adrenalin may produce quite an improvement in the circulation. By constricting the peripheral vessels directly, especially those of the splanchnic area, it produces an immediate rise in the blood pressure, and by stimulating the accelerator nerve-endings in the heart it produces a stronger systolic contraction and a more complete emptying of the cardiac chambers. Adrenalin, however, can be a two-edged weapon, for by increasing the irritability of the heart it may favour the development of fibrillary contractions or ventricular fibrillation, which in man is incompatible

with life. Hence, the use of adrenalin needs caution, and it is safer to give small repeated doses than a single large dose. If the blood pressure shows signs of falling, 5 minimis of a 1-1000 solution can be injected subcutaneously, and repeated if necessary. If, however, cardiovascular collapse threatens, the same dose may be given intravenously. Not infrequently this will be of distinct benefit. Even when the pulse and respiration become almost imperceptible, the blood pressure falls to zero, and the patient turns pale, cold and clammy, an intravenous injection will sometimes rapidly raise the blood pressure and restore consciousness. Should an intravenous injection prove ineffectual, an intra-cardiac one may and should be tried as a last resource.

Pituitrin is also useful under similar circumstances, although rather less so than adrenalin. For, as it does not discriminate between the splanchnic and the other parts of the vascular system, it is unable to produce the necessary redistribution of the blood.

Caffeine is still regarded by many as a direct cardiac stimulant. As Cushing³¹ points out, however, "its reputation as a cardiac stimulant may probably arise from its efficacy in removing dropsy in heart disease, but this is the result of its renal action, and the heart is not affected directly." Even as a respiratory stimulant its action is weak and fleeting. Yet, as Meakins and Davies¹² demonstrated, it can increase pulmonary ventilation at a lowered level of CO₂ tension in the arterial blood, and this it does by increasing not only the rate of respiration but also the volume. It must be remembered, however, that caffeine increases any tendency to nervous irritability, insomnia or delirium.

Lastly, with regard to camphor, a drug administered as a cardiac stimulant with almost religious constancy in German-speaking countries, the most divergent results have been obtained experimentally. There is no proof, however, that it acts on the heart muscle, although it appears to exert some reflex influence on the medullary centres.

Many other remedies have, of course, been employed in this complex and dangerous disease, but perhaps it is wisest to grasp the mode of action of the more reliable drugs, and to use these with discrimination.

Objection might perhaps be raised that too

much attention has been given to the proper use of oxygen, digitalis, hypnotics and certain more or less useful drugs for supporting the circulation in acute emergencies. The medical pessimist might argue that all these measures are merely palliative, and the therapeutic nihilist might even sweep the whole scheme aside as of no use, since the cause of the pathological condition is not thereby removed. Perhaps what Haldane says of oxygen therapy may be true of the other measures as well, and serve as a useful corrective. As a physiologist, he denies categorically the validity of such deprecatory arguments. "The body," he declares, "is no machine, but an organism tending to maintain or revert to the normal, and the respite afforded by such measures as the temporary administration of oxygen is not wasted but utilized for recuperation."

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THE STANDARDIZATION OF ROENTGENOGRAPHY*

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WE see much in our literature about the standardization of x-ray therapy and little or nothing of the standardization of roentgenography, yet, the latter is surely the major function of the x-ray.

The writer has had the following experience. Stereoscopic chest films were interpreted as showing no abnormal shadows. The same individual was in error again radiographed at a very short interval, and the films on this occasion were interpreted as showing characteristic tuberculous deposits. On review of both sets of films, we were forced to agree with the original interpretations in each case. The changes were apparently of technical origin. Each set of films would be classed as satisfactory from the technical standpoint, the difference being a rather minor one, of density.

We are all familiar with the vastly different appearance of films produced in different laboratories, or in the same laboratory at different times. In chest work, for example, it is fundamental that we be able to reproduce technique when re-raying a chest for purposes of comparison. In comparing chest films of different technical characters, it is often extraordinarily difficult to determine whether pathological lesions have actually extended or receded, or whether given changes are of technical origin.

We would submit that the aim of x-ray technique must be to reproduce as accurately as possible the physical characters of the causative object. The science of technical radiography has been outstripped by our zeal for applying the

new toy to our clinical needs. It is apparent that we must revert to basic physics to put our science on a more secure footing. This need for revision is clearly evidenced by the place individual opinion holds in technique as it now stands. Dr. "A" considers a film to be ideal technically; Dr. "B" "prefers" a different type; and Dr. "C" still another. Our technically correct film must surely be the one that most accurately reproduces the structures radiographed, and as such is not a matter for widely varying opinions and preferences. We will analyze some of the physical factors that go to make up x-ray technique.

EQUIPMENT

High potential generators. There are two fundamental considerations in the selection of high potential equipment, namely, capacity and control. Technical methods are demanding increasingly large currents in the tube circuit, with, of course, the necessary voltage. This requires relatively large wire in the secondary of the high potential transformer. The need for large capacity is directly attributable to the use of increased tube distances and increased speed of exposure.

We are frequently told that it is useless to design generating apparatus with capacity in excess of that of our x-ray tubes. With this sentiment we are in entire disagreement. In many technical procedures we are obliged to grossly overload the tubes. This damages and destroys tubes and is a costly form of entertainment. It is, however, for the time being unavoidable, and must be considered as a normal charge against upkeep, if we are not to sacrifice efficiency to cost.

To use these larger currents, delicate control of

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both current and voltage is indispensable. Control involves three factors: (1) means of control; (2) measurement of control; and (3) stabilization of electrical factors.

The control of high voltages requires the use of multiple-step auto-transformers. We consider the usual jumps of three kilovolts or more to be entirely inadequate for modern technique, and recommend steps of not greater than one kilovolt.

The measurement of voltage and current becomes difficult only when these are of sufficient magnitude to damage or destroy the tube if we attempt to make sphere-gap or meter readings. The voltage in the primary of the high-tension transformer is helpful for purposes of duplication. The current in the Coolidge circuit may similarly be used for duplication of current effects in the high tension circuit, with a given tube under stable conditions of vacuum. These methods, however, do not give high tension voltage or current readings, and it is usually necessary to depend on film effect as determined by trial. A method of making such determinations would be an invaluable aid to the roentgenologist but is probably not an accomplishment of the near future.

Stabilization of electrical factors is also a vital need when using the larger electrical units. Satisfactory stabilizers for the current in the Coolidge circuit are available. More desirable, however, is the automatic stabilization of the entire electrical unit by line control. Such a development may be expected.

There remains the control of current in the high tension circuit. As stated, the current measurement in the Coolidge circuit is our best guide for duplication. Here we may be again confronted with limitations in capacity and measurement. We consider the commonly used high limit of five ampères in the Coolidge transformer and ammeter to be inadequate. These should be available to probably six ampères. It is true that cathode filaments are not designed to operate with more than five ampères, but this overload, in order to attain speed and tube distance, must again be considered a normal charge against operation. Incidentally, we have not seen filaments damaged by the use of high currents for short times.

Regarding ammeters, it is important that very delicate adjustment be possible when currents above five ampères are used. In this range, minute changes in the Coolidge current result in large changes in the high tension current. Meters in this range should, therefore, be spread over as

large a dial as possible with multiple sub-divisions. We have found very helpful for delicate adjustment the use of a large magnifying glass focussed on the dial of the ammeter.

In conclusion, as regards high potential apparatus, I am satisfied that any deficiencies we may experience are largely a matter of demand rather than development, and that the manufacturers will readily supply us with any degree of capacity or control for which we may ask.

X-ray films are well standardized as to uniformity, and are slowly improving in quality and speed. Faster or more sensitive films are, however, highly desirable from the roentgenographer's standpoint. The major benefits of faster films we would list, first, as the ability to use increased tube distances, and, secondly, the attainment of greater speed; or, conversely, the lowering of tube costs under constant conditions. It is also possible that a film of higher light sensitivity and lower x-ray sensitivity might be developed for use with intensifying screens only, and thus attain speed while maintaining contrast.

We are well aware of the disadvantages of more sensitive film, namely, ease of fog and instability of emulsion. Contrast should be maintained by the use of rays of as low penetration as possible, and large currents to maintain the time element when necessary.

The point at which contrast gained by low voltage would be more than offset by fog in the more sensitive film is a matter for experiment. The manufacturers tell us that this point is attained in the present film having regard to widespread climatic conditions. Presuming that film sensitivity and stability run parallel, those of us who live in temperate climates, or are willing to provide special storage facilities, are, perhaps, paying a premium in loss of attainable speed.

Stability of emulsion is presumably a merchandizing problem which can be overcome if the consumer demands a more sensitive (less stable) emulsion, and is willing to pay. Thus frequent delivery of small amounts of film, and low temperature storage facilities, might be necessary, or additional chemical manipulation. We might take a leaf from the book of the astronomers who, we understand, have developed films of extraordinarily high sensitivity for photographing moving celestial bodies. Improvement in film will, undoubtedly, be attained by the manufacturers, but can be accelerated by professional demand.

Intensifying screens are also of high grade in their class and are well standardized. They are at present indispensable in the fight against scattered radiation. Under the best conditions, however, their effect is decidedly damaging to film detail, and they should be used only when necessary for the control of scattered radiation. We shall probably see slow improvement in screens as the years pass.

X-ray tubes leave much to be desired in uniformity and durability. They constitute much the weakest link in our equipment, and are the chief source of difficulty in large capacity work; this, because of the great variation of the physical factors among different tubes, and the changes that occur in the tubes with use. The details are rather beyond the scope of this paper, and we recognize that the difficulties are tremendous. We have confidence, however, that the manufacturers can and will give us tubes of greater capacity, greater durability, and greater uniformity.

Accessories for the control of scattered radiation will probably also undergo outstanding improvement. We require a Buckey grid that will move at a reasonably high rate of speed and permit faster exposures. We require a grid with only air spacers between the metal strips. The great bulk of the ray absorbed by the Buckey grid is absorbed by the wooden spacers and not by the lead. This layer of wood, in addition, is a wonderfully effective scatterer of radiations in

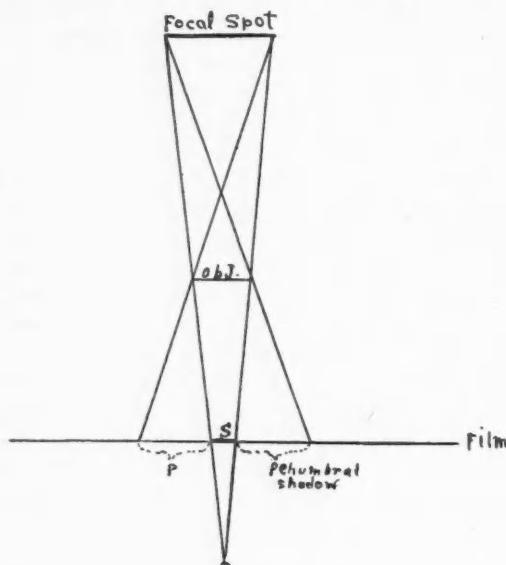
itself. Other types of scattered radiation absorbers can undoubtedly be devised.

Target film distance. In any radiographic procedure, there must be a point of election for the focal spot in relation to the film. A lesser distance lowers radiographic quality, and a greater distance does not improve it within useful limits. This may sound elementary, yet no one has told us how to determine this point. This is necessarily a simple mathematical procedure based on the physical constants in use.

Thus in the first diagram the shadow of the object is indicated on the film as S. It is apparent that when the object is smaller than the focal spot, that conditions can readily occur by which the shadow is completely obliterated. This might occur if the film were moved to the position O, or if the object were smaller, or the focal spot larger than the size depicted. The focal spots of x-ray tubes commonly used in radiography range from one-third to one-ninth of an inch in diameter. The linear structures of bones and lungs, which comprise the bulk of radiograms requiring detail, are much smaller than this, and thus readily lend themselves to obliteration by this means. It is a simple mathematical procedure to determine at what distance a focal spot of given size must be placed, to radiograph an object of known size at a known film distance.

Again, in Diagram 1 the bracketed areas on either side of the shadow are areas of partial radiation. Their width determines the sharpness of the edges of the shadow. The width of these penumbral shadows is determined, first, by the relative distance of the object from the film and the focal spot, and, secondly, by the size of the focal spot. For practical radiography we should determine what width of penumbral shadow represents a satisfactory degree of sharpness on the film, and have available charts of tube distance necessary to secure this standard for any focal spot size at an object film distance. We are quite unsympathetic with the reply, as regards tube distance, that this will make the exposure too long, or that the tube stand is not high enough, etc. We must first determine the fundamentals essential to adequate technical results. The difficulties incident thereto must then be dealt with on their own merits.

The time of exposure is determined by our ability to immobilize the part. This resolves itself into fractional seconds, only in the case of the heart and lungs, and, perhaps, the gastro-intestinal tract. Besides the movements due to



respiration, we must take cognizance of the movements in the pulmonary structures due to their vascular content or vascular contacts. The degree to which we should control movement by speed in heart and lung exposures is still a matter of opinion among roentgenologists. The degree of movement also varies with the subject. This should be put on a scientific basis. Speed must be sufficient to allow radiographic reproduction of the parts, but excess speed is costly.

McPhedran and Weyle¹ at the Phipps Institute in Philadelphia have arranged an apparatus by which the time of exposure is synchronized with the vascular phase. This procedure should certainly be analyzed to determine whether or not it is an essential to accurate roentgenographic reproductions.

It might be well also to include a word about timers. For split-second work, especially when 25 cycle currents are used, timers that deal in wave peaks rather than elapsed time are the only possible instruments of precision. The second

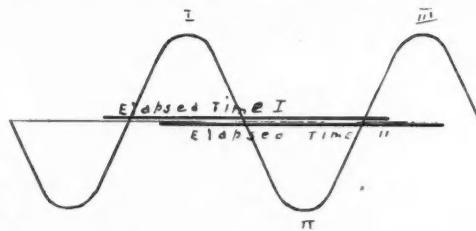


diagram illustrates this point. It is seen that in a unit of elapsed time occurring at Position 2, three wave peaks are used. If this same unit of time occurs at Position 1, only two peaks are included. The difference in radiation may thus be 50 per cent with a constant time interval.

The table shows the possible percentage errors in radiation with various time units. If the number of cycles is evenly divisible by the denominator of the time fraction, no variation in the number of peaks per unit of time is possible; if not evenly divisible, a difference in the number of peaks is always possible. This might well be kept in mind in using other than impulse timers for split second work. It will be noted also that the possible errors with timers dealing with elapsed time, is considerably greater with 25 cycle than with 60 cycle currents.

Density and contrast, also, are at the moment altogether too much matters of opinion among roentgenologists. Both underexposed and overexposed films can readily destroy the visibility of important pathological lesions. The correct

TABLE

Elapsed time in seconds	25 Cycle		60 Cycle	
	Possible peaks	Possible error per cent	Possible peaks	Possible error per cent
1	50 only	0	120 only	0
$\frac{3}{4}$	37 or 38	2.7	90	0
$\frac{1}{2}$	25	0	60	0
$\frac{9}{20}$	22 or 23	4.55	54	0
$\frac{8}{20} \text{ or } \frac{2}{5}$	20	0	48	0
$\frac{7}{20}$	17 or 18	5.9	42	0
$\frac{6}{20}$	15	0	36	0
$\frac{5}{20} \text{ or } \frac{1}{4}$	12 or 13	8.3	30	0
$\frac{4}{20} \text{ or } \frac{1}{5}$	10	0	24	0
$\frac{3}{20}$	7 or 8	14.3	18	0
$\frac{2}{20} \text{ or } \frac{1}{10}$	5	0	12	0
$\frac{1}{20}$	2 or 3	50	6	0
$\frac{1}{16}$	3 or 4	33.3	7 or 8	14.3
$\frac{1}{8}$	6 or 7	16.7	15	0
$\frac{3}{8}$	18 or 19	5.6	46	0
$\frac{2}{25}$	4	0	9 or 10	11.1
$\frac{1}{25}$	2	0	$4\frac{1}{2}$ or 5	11.1
$\frac{1}{50}$	1 only	0	2 or 3	50.

density and contrast are necessarily those which reproduce most accurately the presence and characters of the anatomical structures under review. We know radiologists of standing who prefer films of brilliant contrast, and others who think that pathological changes are better displayed in films of lesser contrast. The writer has made a tentative study of a group of individuals, making serial films of varying density and varying contrast to determine which type shows the most shadows to the best advantage. It was interesting that different types of films, technically speaking, rendered visible different types of structure and no one type of film reproduced all structures to the best advantage.

We predict that future x-ray diagnostic studies will comprise a series of films of different technical qualities. As a preliminary to such an advance, we must first know what technical qualities in films we desire, and, secondly, must learn how to produce and control these factors with relative precision.

X-ray education. The bulk of roentgenologists are "self made," and have no fundamental x-ray

training other than what they have acquired from experience and practice. The roentgenologist of to-morrow must be a physicist. Physics is to the science of roentgenology what physiology and pathology are to internal medicine. Without this fundamental basis, the radiologist cannot hope to attain a high degree of proficiency. The roentgenologist must be a technician. Excellent as our non-professional technicians may be, we can expect them to attain only the standards we lay down for them. A major fault of technology, as we see it, is inability to criticize a

given film and determine what alterations should be made to attain the desired end-result.

In conclusion, we are looking forward to the time when our North American universities will follow the lead of certain British institutions, and provide us with detailed courses and diplomas in the physics and application of the roentgen ray.

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POLIOMYELITIS IN MANITOBA IN 1928*

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THE organization undertaken in Manitoba to combat the epidemic of poliomyelitis in 1928, was instituted by the Honourable Dr. E. W. Montgomery, Minister of Health and Public Service. He utilized the services of the Medical Research Committee of the University of Manitoba, to whom all credit is due for the very efficient manner in which they conducted the work. Any information, new or confirmatory, which was unearthed in this study was entirely due to their efforts. The tremendous strength of organized medicine, where team-work and co-operation are possible, as compared with the feeble efforts of the lone-handed physician, is undoubtedly the most important lesson we learned from the epidemic.

Poliomyelitis first appeared in Scandinavia in 1881. From that year till the present it has been endemic there, reaching its height in the year 1911, when there were 5,000 cases. No country has escaped this disease. It has occurred in all climates, but northern Europe and America have had the largest epidemics. The epidemics in the British Isles have been small, but, as in many other countries are growing yearly in magnitude. The first epidemic to be reported on this continent occurred in 1894, in Vermont, U.S.A. In 1916, an epidemic unprecedented in extent and

severity occurred in the United States and Canada. There were 13,000 cases in New York State, two-thirds of which occurred in New York City. No large epidemic has occurred since. The fact that only 70 cases were reported in 1917 in New York State, is interesting, and a sudden drop in the number of cases is characteristic of most epidemics.

We have no complete epidemiological reports on poliomyelitis in Canada prior to 1924. We did have poliomyelitis before that date, but it is difficult to surmise how many cases actually occurred. There were 150 cases in 1924; 200 cases in 1925; 200 cases in 1926, 680 cases in 1927 and 788 cases in 1928. Most of the cases (400) of 1927 were in British Columbia and Alberta. Of the 788 cases in 1928, 435 were in the eastern half of Manitoba, and 90 were in Alberta.

From our knowledge of the incidence of this disease, we must reconcile ourselves to the fact that we cannot escape an annual visitation of it at some point in our large country. For your discomposure, it has been said by some epidemiologists that, since it appeared in epidemic form in the Pacific States and British Columbia, on the last occasion, in 1927, it seems to be travelling eastward. We in the west hope that it continues to travel, but would wish that it would travel northward to the region of the Barren Lands!

* Paper read at meeting of Ontario Medical Association, Hamilton, May, 1929.

I do not believe that there is any disease that can frighten the people so profoundly, as poliomyelitis. In Winnipeg, last year, it incited a terror among them much like that caused by the air-raids during the war.

In the Province of Manitoba, the 435 cases were distributed as follows: 237 cases in the City, 67 cases in the suburbs, and 133 cases in the rest of the province. There were only 33 cases in that portion of the province west of Lake Manitoba. This number represents a case incidence of about one in a thousand of the population, which is the usual incidence in most large epidemics, but is often far exceeded in small communities. There were 37 deaths—that is a mortality of 8.7 per cent.

One cannot help reflecting on the complacency of the people towards diseases that are constantly with us and take a far greater toll in lives. For example, in the three winter months when the pneumonias were at their height there were 63 deaths from this cause alone in Manitoba, and while poliomyelitis was raging, though it caused but 35 deaths, there were 118 deaths under 4 years, in the city of Winnipeg from gastro-intestinal diseases, which passed unnoticed. Yet the public is decidedly perturbed by the knowledge that poliomyelitis is about. Organized medical bodies are confronted with these alternatives—either to ignore the public and try to conceal from the people the knowledge of the presence of an epidemic, or to give them full information through the press. The latter plan was adopted in Winnipeg. At a special meeting of the Winnipeg Medical Society, poliomyelitis was discussed, and, among other decisions, a Committee was selected to prepare suitable articles for the newspapers. These appeared daily for a week, and were decidedly instructive. It is my opinion that any information given to the people in an event like this should carefully attempt to allay their alarms by acquainting them with the knowledge that the mortality is not so dreadful, the sequelæ not so serious, and that the incidence only averages one in a thousand of the population.

This epidemic began with a single case at the end of June, and there were only 21 cases in July, most of these in the latter half of the month; 143 occurred in August; 231 in September; 35 in October, and 5 in November. The

epidemic reached its peak during the first week in September. Of the deaths, 2 were in July, 17 in August, 15 in September, and 2 in October.

As to the age incidence; 30 per cent were under 5 years; 35 per cent were between 5 and 10 years; 18 per cent were between 10 and 15 years; 10 per cent were between 15 and 20 years; 3 per cent were between 20 and 25 years and 3 per cent beyond this age.

Aycock says that in concentrated populations the peak of incidence is between 2 and 3 years, while among the rural population the age incidence is later. This difference in age distribution, notwithstanding the fact that the incidence of poliomyelitis is greater in rural sections than in cities, suggests that with the concentration of population, and, as may be assumed, with greater personal contact, there is a widespread distribution of the virus, resulting not in greater incidence than in the rural sections but in a widespread immunization. The peak of age incidence in the epidemic in Manitoba was slightly over five years. The age incidence was older in the province at large than in the city. The sex incidence was 56 per cent males, 44 per cent females—the usual proportion for most epidemics.

The fact that the virus has been isolated is generally admitted. It was first discovered that it was filterable by several independent workers in France, Germany, and the United States, in the years 1909 to 1912. Flexner and Noguchi in 1913 announced that they had isolated the organism which they referred to as "globoid bodies." There is an impression abroad that the "globoid bodies" are indefinite structures; as a matter of fact they are definite organisms, though exceedingly small. Rosenow has made studies of the cultivation of a streptococcus which he maintains is the causal agent of the disease. As yet his findings have not shaken the confidence placed in the work of Flexner and Noguchi. Amoss says that the invasion of the streptococcus is an agonized event.

The mode of transmission of the virus is the greatest problem awaiting solution, and in this direction, the Winnipeg Committee has made some contribution. In this epidemic there were 13 families investigated in which there were 2 or more definite cases in each. There were 12 more families in each of which there were 2

reported cases, or a second, doubtful. Contact was definitely established in 8 more instances.

The occurrence of multiple cases in one family is greater in this epidemic than has usually been the case. In epidemics where the incidence has been recorded, multiple cases amount to 4 or 5 per cent. In Vermont, it has been observed that, almost invariably, these multiple cases occur nearly simultaneously, suggesting infection from the same source, rather than from one to another. This was not the experience in Manitoba. A lapse of 6 or 7 or more days intervened between the onset of two cases in a given family in 14 instances; sufficiently often to impress on one the direct transference of the disease from one patient to another individual.

The infection is transmitted, it is thought, by the nasal secretions, via the naso-pharyngeal mucous membrane to the central nervous system. The existence of healthy carriers has been proved, but the complete solution of the transmission of the disease is by no means settled.

Many of the other infectious diseases—chicken pox, measles, diphtheria, scarlet fever, whooping cough, can be exactly followed in their peregrinations. So, too, can an outbreak of typhoid fever be traced to its origin. Not so with poliomyelitis! It is very mystifying and very intriguing.

Time forbids any prolonged consideration of the symptomatology. The clinical classification of the types outlined by Peabody, Draper and Dochez is most inclusive and adaptable: (1) the non-paralytic or abortive type; (2) the spinal type, in which the disease is one of the lower motor neuron, the common form; (3) the cerebral type, in which the upper motor neuron is involved.

This classification does not form a basis for clean-cut differentiation as does that of Wickman, whose description of poliomyelitis is almost a classic, but whose classification has lost favour because of its complexity.

A typical attack of poliomyelitis presents a fairly characteristic picture, and if the possibility of its occurrence in the season in which it prevails is borne in mind one should be awakened into a suspicion of its presence.

The onset is sudden with fever and malaise. The child comes in from play to lie down. He

complains of headache and feels ill. Moreover, he looks ill, to a greater degree than would be the case in most febrile states. In bed he desires quiet and solitude, and resents being molested. He turns away from his examiner and lies curled up in bed. The face is flushed, the skin moist, the tongue dry and furred. The expression is one of distress and anxiety. The eyes are dull.

On examination there is rebellion and crying. There seems to be generalized pain; sometimes acute hyperesthesia. It has been said that the severity of tenderness in the muscles is some guide as to the site of the paralysis that may follow. The response of the deep reflexes is variable. Sometimes it is very active, oftener completely gone. The superficial abdominal reflexes are often quickly abolished. A decided tâche cerebrale is frequently seen. Kernig's sign is common, though not well marked. Stiffness of the neck is slight or of moderate degree. Stiffness of the whole spine, or "poker back," is the most common and unusual sign to aid one in an early diagnosis. A child presenting these signs and symptoms should be suspected and should have a lumbar puncture performed without delay.

The Winnipeg Committee have tabulated the occurrence of the signs and symptoms in the epidemic they studied. I will not recite the complete analysis, but a few of the most frequently encountered features are as follows:

Fever	87.5	per cent
Frontal headache	80	"
Stiff, sore neck and back.....	73	"
Lumbar pain	50	"
Anorexia	46	"
Malaise	48	"
Vomiting	41	"
Pains in the limbs.....	37	"
Irritability and restlessness....	37	"
Paresis	33	"
Drowsiness	26	"
Constipation	24	"
Nausea	17	"
Paralysis	17	"
Tremor	13	"

Less frequent symptoms were coryza, hyperesthesia, chills, rash, interscapular pain, occipital headache, chest pain, sore throat, vertigo, general weakness, insomnia, diarrhoea, diaphoresis, epistaxis, delirium, girdle pains. One notable and unexpected feature about this disease is the absence of convulsions.

The commoner physical findings were found

by these observers to occur in the following percentages.

The spine sign.....	73 per cent
Rigid neck	52 "
Kernig's sign	36 "
Paresis or paralysis.....	49 "

The knee jerks were exaggerated in 21 per cent and diminished or absent—usually the latter—in 51 per cent. The abdominal reflexes were absent in 39 per cent. An infected throat was found in 40 per cent and an adenitis in 21 per cent.

TREATMENT

At present, convalescent serum seems the most logical form of treatment to use. Treatment with urotropine, adrenalin, and hypertonic saline intravenously, has not given encouraging results. Experimentally, Flexner proved that urotropine by the mouth increased the resistance of monkeys to the infection. A dose of from one-half to five grains three times a day is recommended for use as a helpful prophylactic measure.

The basis for serum treatment rests upon the observation that immune bodies are present in the blood of recovered cases. In the beginning, and in most cases since where it has been used the serum has been given intrathecally or intravenously. In Winnipeg it was administered intramuscularly. This method was recommended by Dr. Cadham for the following reasons: that the serum is absorbed into the blood stream swiftly; that the administration is easily accomplished; that no undesirable symptoms or accidents occur; that no matching is required; and that intraspinal injection does not get directly at the lesions, as one might think it would.

That the results of serum therapy are hopeful is the opinion of most observers, and we in Winnipeg are distinctly of that opinion. Peabody is not convinced. But it is a difficult question to decide, and the most certain means of solution would be to treat only alternate cases in a given epidemic and compare results, if one had the temerity to attempt it. Draper has said that cases in which the cell count exceeds 100 are severe cases, and where it exceeds 500 paralysis is bound to ensue. If so, with careful cell counts in cases treated by serum, it would seem possible to measure the

worth of this form of therapy. In Winnipeg, the value of serum therapy were adjudged by a comparison of results in the treated and untreated cases. I think they will stand the most critical scrutiny.

One hundred and sixty-one cases were selected for their report. The bases of selection were: (1) availability, (2) an accurate diagnosis, (3) reliable records.

Of these 161 cases, 74 received early treatment. Sixty-nine, or 93 per cent, completely recovered, 4 showed residual paralysis, and there were no deaths.

Serum was given to 33 cases after the advent of paralysis. Seven, or 22 per cent, completely recovered; 15, or 45 per cent, showed residual paralysis; and 11, or 33 per cent, died.

Fifty-four received no serum; 34, or 53 per cent, showed residual paralysis; and 6, or 11 per cent, died.

The Committee anticipated the observation that the virus becomes attenuated in the latter part of the epidemic. They demonstrated from their results that this is a fact.

They compared the results of the treated and untreated cases month by month, and arrived at the same conviction of the efficacy of the serum. For example, in September, of 22 cases untreated 36 per cent made a complete recovery; while, of 50 cases treated with serum 94 per cent completely recovered. Better results are not reported in the literature. The serum was Wassermann tested; after the addition of 0.25 per cent of tricresol, it was put up in separate doses of 25 c.c. each.

It is desirable for each large centre to depend on its own resources for the necessary serum. To apply to other cities takes too much time and it cannot be foretold when they, too, may need all that is available. Nor are any but the earliest cases of an epidemic suitable as donors, unless the epidemic is of long duration. Donors should be paid. They should not be bled too freely but should be encouraged to return for repeated contributions. In Winnipeg an acute shortage was felt until a suitable appeal for volunteers was made through the newspapers, after which there was no shortage. The serum only should be transported to a distance. Whole blood is unsuitable.

If an outbreak of this disease should occur in a community, the people will be anxious to

know what preventive measures can be taken. That such advice may be available early, there is no better medium than the press to spread it. Of course, to be sound, it should be prepared by the medical profession.

In Vermont, very definite public health legislation is enforced in respect to this disease. Their attitude towards its control is considered judicious. During an epidemic, travel, and visiting are forbidden, except when absolutely necessary. It would seem that this is a wise precaution, when motor travelling is so prevalent. Definite instances are known in Manitoba where cases occurred while away from home. And with the people in a highly nervous state, there will be many who will be willing to escape by motor to some distant place where the disease has not made its appearance. This is manifestly unsafe and unfair.

Children should not mingle in crowds or play in groups. They should not roam. Personal cleanliness and good respiratory manners should be observed. The killing of flies and insects, the avoidance of pet animals, the washing of fruit and vegetables, are precautions that may appear ridiculous, but one should not neglect them.

The chairman of this committee was Dr. C. R. Gilmour, Professor of Medicine—the Secretary, Dr. A. T. Cameron, Professor of Biochemistry. They appointed Dr. John M. McEachern, Dr. Mary Mackenzie, Dr. Bruce Chown, and Dr. Lennox Bell, with one or two internes, to do the actual investigation. Dr. Fred Cadham, Provincial Bacteriologist, was responsible for the collection, preparation, and distribution of the convalescent serum used. Dr. William Boyd, Professor of Pathology, was responsible for the investigation of the pathology of the epidemic. Dr. A. J. Douglas, M.O.H. of Winnipeg was, as always, a great source of help to the whole profession and to this committee.

The Great West Life Assurance Company have printed for distribution a complete report of the epidemic, prepared by this committee.

VISUALIZATION OF A CYSTOCELE BY CYSTOGRAM*

By H. GURTH PRETTY, M.D.,

THE term cystocele implies a vesical or vesico-urethral hernia through the supports at the base of the female bladder, which have been stretched or torn as result of trauma. Childbirth is by far its most common contributory cause, since less than 5 per cent of cases occur in nulliparae. Hypertrophy and laxity of the anterior vaginal wall must not be confused with cystocele, nor must the degree of cystocele be considered to bear a direct relation to the symptoms. The symptoms however occur in proportion to the degree of irritation of the trigone of the bladder; hence, the more the trigone is involved by the cystocele the more acute are the symptoms.

Normally, a strong musculo-fascial layer known as the pubo-vesico-cervical fascia, passes from the back of the pubes to the lateral aspects of the cervix uteri and becomes continuous with the rectal fascia, taking origin on the posterior aspect of the symphysis pubes, at the junction of the upper and middle third of the vertical

plane. The base of the bladder rests directly and is supported by the pubo-vesico-cervical fascia, which, as a result of the prolonged second stage of labour, is stretched or lacerated, thereby producing a cystocele. If, however, only that part of the pubo-vesico-cervical fascia which supports the neck of the bladder is injured, incontinence may occur without clinical cystocele. Incontinence in this case is due to sagging of the trigone of the bladder rather than injury to the urethral sphincter. A very slight hernia of the bladder through the pubo-vesico-cervical fascia (pillars of the bladder) immediately below the trigone sets up a trigonitis which will give rise to the typical triad of frequency, urgency, and dysuria.

Under such conditions the urine is usually negative in all respects; there is very little evidence of sagging of the anterior vaginal wall when the patient is standing and bearing down; clinically, there is not a cystocele. Finally, cystoscopic examination fails to reveal the sagging of the trigone of the bladder. Nevertheless, there are numerous instances in which the symptoms have been entirely relieved by merely folding the pubo-vesico-

* This paper was read before the Gynaecological and Urological sections of the Canadian Medical Association meeting, Montreal, June, 1929.

From the Gynaecological Clinic of the Montreal General Hospital.

cervical fascia under the base of the bladder.

En passant, it may be mentioned, that in the clinic, it has been frequently noted that multi-parous women complaining of frequency and dribbling not only have a cystocele but in addition diabetes mellitus. Furthermore, in a review of our cases, the observation has been made that many patients complaining of cystocele symptoms, especially those in which prolapse is complete, have a diminished tolerance and delayed assimilation for carbohydrates. Herein lies the relationship between the urologist and the gynaecologist, since this type of patient seeks advice from the urologist, who having made a complete examination of the urological tract finds nothing to account for the frequency, and therefore refers the patient to the gynaecologist. The mediator between the urologist and the gynaecologist has been found in the x-ray department. By means of a cystogram, i.e., an x-ray plate of the pelvis and bladder after the injection of 200 to 300 c.c. of silver iodide solution, the degree of herniation of the bladder may be accurately determined. Therefore, the cystogram will confirm the diagnosis in all cases of suspected herniation through the pubo-vesico-cervical fascia. Furthermore, if a cystogram be taken of an obvious case of cystocele, and the degree of herniation estimated from it prior to the case going to operation, it may be compared with a post-operative cystogram. By this method we have an absolute check on the operation for repair of the cystocele. I may say that this method has been a very great aid in checking up the post-operative results, has entirely disproved the efficacy of some operations, and at the same time has pointed out weak points in others.

The following figures illustrate the anatomical positions of the bladder as seen in the normal, the traumatized, and the repaired pelvis with special accentuation of the pillars of the bladder, whereas the cystograms are antero-posterior views of the injected bladder. In each case the figures are so arranged that the cystogram corresponds to the preceding anatomical sketch.

In consideration of the normal pelvis let us take an adult virgin pelvis, shown in Figs. 1 and 2. In Fig. 1 the bladder is seen to be situated between the symphysis pubis and the cervix uteri, the base of which is supported by

the pubo-vesico-cervical fascia. The base of the bladder is funnel-shaped, and in this position it is completely drained by the urethra. The cystogram of the same pelvis (Fig. 2) shows the relation of the base of the bladder to the symphysis pubis; its base line corresponds to the junction of the upper and middle third of the vertical plane of the symphysis pubis, this being the point of attachment of the pubo-vesico-cervical fascia to the symphysis pubis. A cystocele is therefore diagnosed by cystogram if there be any sagging of the base of the bladder below a line drawn at right angles to the vertical plane of the symphysis pubis through the junction of the upper and middle third.

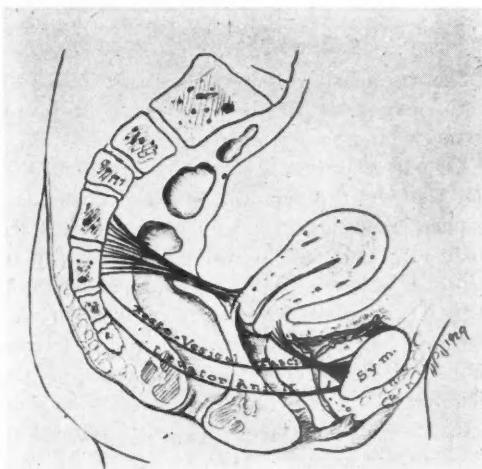


FIG. 1

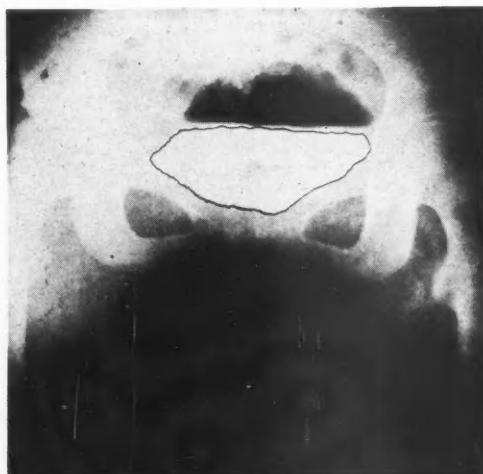


FIG. 2



FIG. 3

The traumatized pelvis, a result of childbirth, may show a mild, moderate, or severe cystocele, and occasionally procidentia.

A moderately severe herniation of the floor of the bladder through the pubo-vesico-cervical ligament resulting in a high level outlet to the bladder, giving rise to residual urine, may be seen in Fig. 3, with its corresponding cystogram (Fig. 4), showing the base of the bladder corresponding to the lower border of the symphysis pubis. The post-operative cystogram of the same case (Fig. 6), repaired after the method of Fig. 5, in which the cystocele was reduced by plication of the pubo-vesico-cervical fascia *per vaginam*, followed by abdominal uterine suspen-

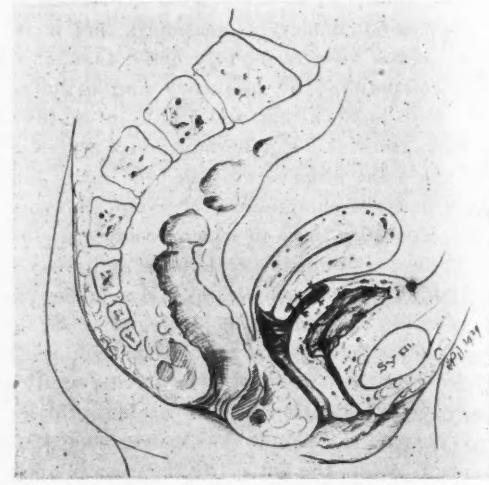


FIG. 5

sion, shows approximately the return of the base of the bladder to normal level.

The most severe cases of cystocele may be diagnosed at a glance, as in the case of complete procidentia (see Fig. 7), where in addition to herniation of the base of the bladder through the pubo-vesico-cervical fascia there is likewise herniation of the uterus through the main ligaments; with the result that the bladder rides down on the herniated cervix uteri. One of the cases (Fig. 8) illustrates the points. Here there is a tumour mass protruding between the labia with two areas of ulceration on the base, one to the right and the other to the left. Midway between the areas of

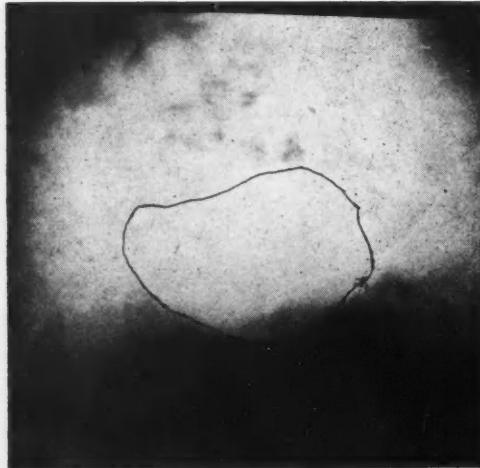


FIG. 4

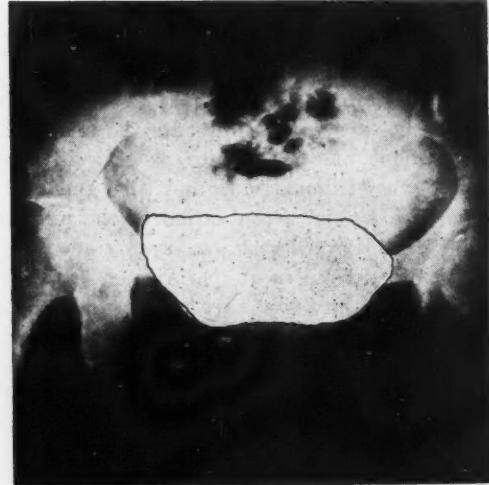


FIG. 6

ulceration there is a triangular depression, the external os uteri. At the upper limit of the tumour is the urethral orifice through which a glass catheter has been inserted, the direction, shown by dotted line, being towards the os uteri. Therefore the entire surface of the tumour is herniated bladder.

A very satisfactory reduction of such an extensive cystocele may be carried out by a Watkin's interposition (Fig. 9), in cases after the menopause, whereby the fundus of the uterus is utilised to splint the base of the bladder. A Watkin's repair was performed on the case illustrated in Fig. 8, with an excellent result, as seen in Fig. 10. The direction of the catheter should be noted in both conditions.

Cystograms of this case are very instructive

Fig. 11 is the pre-operative cystogram and Fig. 12 the post-operative. In the pre-operative condition the bladder is an extra pelvic organ, the fundus of which corresponds in position to the mid point of the symphysis pubis. The bladder as the result of a Watkin's interposition, has been returned to its relative position in the pelvis with its base line slightly below the normal (see Fig. 12).

Here again is the application of the cystogram in the final check of the operative results. It is no longer necessary to await recurrence of symptoms to know that the operation was incorrectly performed.

Cystography in the female may be very easily carried out after careful consideration of a few minor details. The apparatus is simple

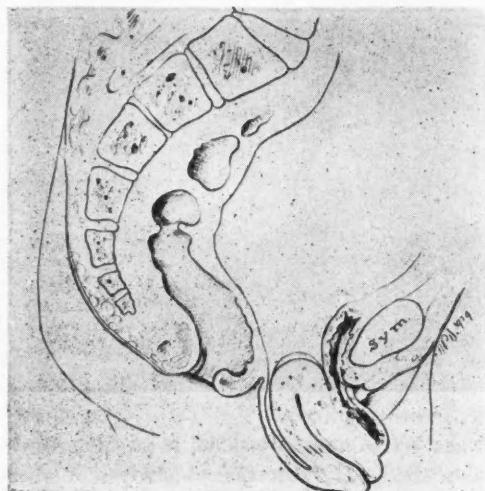


FIG. 7

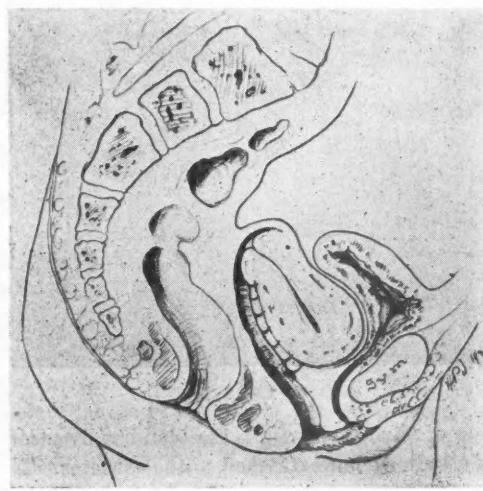


FIG. 9

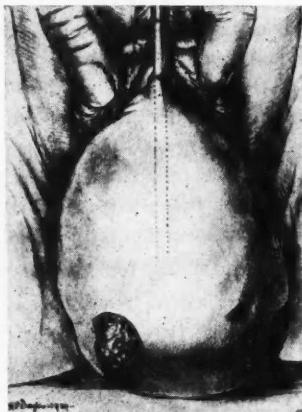


FIG. 8



FIG. 10

and not expensive, since practically all hospitals to-day have a well established x-ray department.

The patient for cystography is placed on an ordinary flat table, so that she lies on her back with the knees flexed, the thighs slightly flexed, the knees apart with the heels together. The urethral orifice is then located and the bladder catheterised with a medium sized glass, or preferably rubber, catheter, employing the necessary aseptic technique. When the urine has drained off the catheter is left *in situ*, in order to inject 200 to 300 c.c. of a lukewarm emul-

less. The patient is then allowed to walk over to a vertical x-ray table equipped with a Bucky diaphragm, where she stands with her hands to the side and her back to table, facing the x-ray tube, which is focused on the symphysis pubis at a distance of 30 inches from the Bucky diaphragm. The patient is instructed to hold her breath and at the same time bear down hard, being careful not to move when signalled by the operator, who then with a 100 M.A. tube gives an exposure of 3 to 4 seconds in the case of moderate adiposity; in the case of the obese it is necessary to give 6 seconds' exposure.

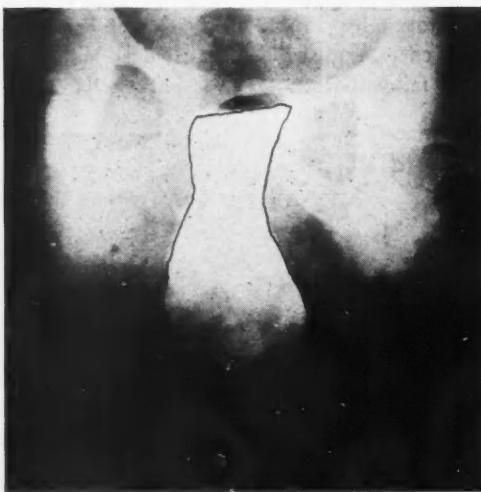


FIG. 11

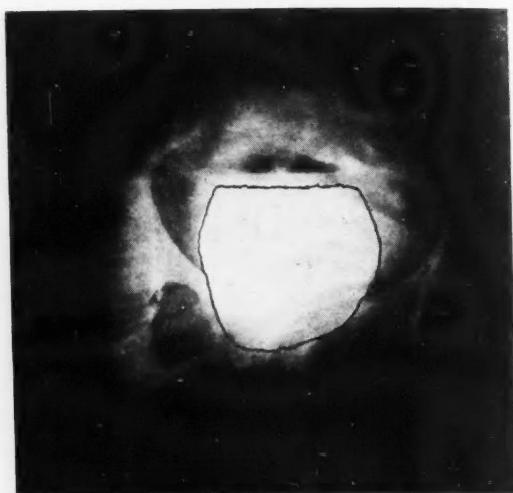


FIG. 12

sion of silver iodide into the bladder, by means of a bulb syringe attached to the catheter. The volume injected is gauged by the capacity of the bladder, that is, cease injecting when the patient complains of pressure in the bladder. It is rarely necessary to inject more than 300 c.c. of silver iodide emulsion; furthermore, if the bladder is over-distended the patient will expel the emulsion before reaching the x-ray table. When the desired quantity has been injected into the bladder, pinch the catheter and withdraw it slowly, and at the same time tell the patient to hold her urine. If any of the emulsion should soil the vagina or labia carefully remove it with a piece of gauze, otherwise it will fog the outline of the cystogram. Silver iodide is used on account of its non-irritating effect upon the bladder mucosa. With the exception of the discomfort of ordinary catheterisation the procedure is pain-

less. The patient is then allowed to walk over to a vertical x-ray table equipped with a Bucky diaphragm, where she stands with her hands to the side and her back to table, facing the x-ray tube, which is focused on the symphysis pubis at a distance of 30 inches from the Bucky diaphragm. The patient is instructed to hold her breath and at the same time bear down hard, being careful not to move when signalled by the operator, who then with a 100 M.A. tube gives an exposure of 3 to 4 seconds in the case of moderate adiposity; in the case of the obese it is necessary to give 6 seconds' exposure.

When cystograms are to be used as an operative check great care must be taken with regard to the position of the x-ray tube. It must be placed in exactly the same position for the post-operative cystogram as for the pre-operative cystogram, otherwise the results as interpreted will not be correct. It is advisable to mark the vertical and horizontal readings taken from the x-ray tube supports on the pre-operative cystogram cover.

CONCLUSIONS

The cystogram will give the following aid.

1. It will help in checking up cases with obscure causes of frequency.

2. It will be a guide to the operative results in repair of the traumatized pelvis.

3. Conclusive evidence in diagnosis of a cystocele.

A STUDY OF SEVERAL CASES OF LEUKOSARCOMA AND MYELOSARCOMA

BY T. F. NICHOLSON, M.B.,

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Toronto

STERNBERG, in 1903, published a review of the diseases of the blood-forming organs in which he classified the cases with large tumours of lymphoid or myeloid cells, associated with a leukæmic state of the blood, as "leukosarcoma" and "myelosarcoma," separating them from the leukæmias on the one hand, and the lymphosarcomata on the other. Those cases in which there was green colouration of the tumours he designated as "chloroleukosarcoma" and "chloromyelosarcoma."

In the majority of his cases of leukosarcomata there were large mediastinal tumours which had the same gross and microscopic characteristics as the lymphosarcomata of the mediastinum, the only distinguishing feature being the presence of a leukæmia. Thirty-four cases of leukosarcoma have been reported by various authors, and in addition three cases have been seen at autopsy in the Department of Pathology of the University of Toronto. Twenty-nine of these cases had massive mediastinal tumours.

The cases of chloroleukosarcoma, or lymphatic chloroma, usually occur in young children, and are commonly characterized by large orbital and frontal tumours which frequently erode the bone. Records of sixty-two cases of this type were found in the literature, but it is probable that a number of these tumours were of the myeloid variety, as a large number of them were diagnosed before the general use of differential stains.

By far the greater number (sixty-five out of seventy) of the myeloid tumours reported in the literature showed green pigmentation of some of the nodules. They were, therefore, reported as myeloid chloromata, and would be classified by Sternberg as chloroleukosarcoma.

In all these cases, lymphoid and myeloid,

there were definite tumour masses which infiltrated the surrounding structures. The mediastinal tumours were indistinguishable from the mediastinal lymphosarcomata. The skull tumours invaded the bone and sometimes the sinuses. In one case (Lewis) the petrous bone was invaded, and the nerve involvement gave rise to symptoms of mastoid infection. In one of Sternberg's cases the malignant process invaded the eye-ball.

The tumours of these groups, although commonest in the mediastinum and over the skull, occurred in various other locations, and in all of these situations they displayed the quality of invading and destroying the surrounding tissue. MacCallum noted tumours in the ileum, and Sternberg ulcerating masses in the perineum and in the breast. In Munk's case there were large tumours in the foot and knee. A number of cases with involvement of the ribs and vertebrae have been reported.

Secondary tumours were widespread, the commonest sites being the ribs and vertebrae. In many instances metastatic nodules were found in the liver and kidneys. Secondary deposits were also seen in such unusual places as the brain and testicle. The spleen was enlarged in most cases, but in a few there was little or no change in size. The blood counts of the leucocytes were as high as 810,000, but usually the very high white counts were terminal events, while during the early stages of the disease the range was between 10,000 and 60,000. In four cases (Paltauf, Buschke and Hirschfeld, Weber, Webster), the blood count was normal at the beginning of the disease, although definite evidence of a mediastinal tumour was present in each instance.

The series here reported consists of four

cases, three lymphoid and one myeloid tumour, all with leukæmic changes in the blood.

CASE 1

M.C., a thirty-six year old male, was admitted to hospital, May 12, 1925, because of loss of weight and a severe pain in the left side. The superficial lymph nodes and the spleen were enlarged. A friction rub was heard over the spleen. The white count on admission was 7,400 per c.mm. with 75 per cent polymorphonuclears and 30 per cent lymphocytes. It rose steadily to 156,800, with 75 per cent lymphocytes shortly before his death on September 25, 1925, five months after the first symptom of the disease.

Autopsy.—The lymph nodes were enlarged. Many of the thoracic and retroperitoneal nodes formed large, firm, friable masses. There was a large, firm, greyish tumour compressing the pylorus, invading and destroying the pancreas, and fusing with a mass of enlarged lymph nodes at the hilum of the spleen. There were numerous, small masses of tumour tissue scattered through the walls of the stomach and intestines. The liver was enlarged and stippled. The spleen was enlarged and pulpy. One portion of its capsule was invaded by tumour growth. The bone marrow was dark red and pulpy.

Microscopic Analysis.—The tumours were composed of densely packed, large cells, having oval or rounded, deeply stained nuclei, and a narrow rim of clear cytoplasm. These cells were invading and destroying the tissue of the pancreas and stomach wall. They obliterated the normal topography of the bone marrow, lymph nodes and spleen, infiltrated the capsules of the latter organs, and invaded the surrounding tissues. All the blood channels were packed with atypical lymphoid cells.

Anatomical Diagnosis.—Leukosarcoma of the lymph nodes; secondary leukosarcoma of pancreas, intestine and stomach; lymphoid hyperplasia of liver, spleen and bone marrow.

CASE 2

W.L., a twenty-six year old male, was admitted on April 29, 1927, because of enlargement of the cervical glands and shortness of breath of two months' duration. The lymph nodes and the spleen were palpably enlarged. There was a sloughing mass in the tonsillar region. The arms became swollen and cyanosed. Large amounts of bloody fluid were removed from the left chest. The patient died on June 12, 1927, of œdema of the glottis and respiratory failure. The white blood count on admission was 30,700 per c.mm., with 58 per cent lymphocytes. Shortly before death the count was 270,000 with 82 per cent lymphocytes.

Autopsy.—There was a large sloughing mass in the right tonsillar region. The superficial lymph nodes were enlarged, firm and discrete. The anterior and posterior mediastina were filled by uniformly firm, greyish white masses, which were attached to the surrounding tissues and were continuous with a firm, friable, greyish white growth that infiltrated the pleura and almost completely replaced the diaphragm. The abdominal lymph nodes were enlarged, soft and friable, blending with each other and with the surrounding tissues. The nodes around the abdominal aorta had fused to form a mass 14.5 by 10 by 4.3 cm. The liver was enlarged and stippled with grey areas. The spleen was large and pulpy. The kidneys each contained from 30 to 40 small, friable, yellowish white nodules, measuring about 0.4 cm. in diameter. The bone marrow was greyish red and pulpy.

Microscopic Analysis.—The tumours were composed of large, irregular lymphoid cells with dark, reticulated nuclei and a clear, scanty cytoplasm. Many mitotic figures were seen. The tumour growth invaded the lung and diaphragm. Secondary nodules invaded and had replaced normal kidney tissue. The normal topography

of the lymph nodes, spleen, and bone marrow was obliterated by abnormal lymphoid cells.

Anatomical Diagnosis.—Leukosarcoma of lymph nodes, mediastinum, pleura, diaphragm, liver, spleen, kidney, and bone marrow.

CASE 3

G.M., a forty year old male, was admitted on November 15, 1927, because of weakness, and swelling of the axillary glands of ten weeks' duration. He had a dull ache over the sternum and a severe cough. The lymph nodes were enlarged. The area of mediastinal dullness was increased. Symptoms of spinal irritation developed. The white blood count on admission was 19,200 per c.mm., with 70 per cent lymphocytes. Nine days before death it was 42,500, with 100 per cent lymphocytes. The patient died on December 21, 1927, of an intestinal hemorrhage.

Autopsy.—The lymph nodes were enlarged, firm and discrete. There was an increase in the cerebrospinal fluid and a small greyish nodule, 0.7 by 0.5 cm., was found in the choroid plexus of each lateral ventricle. The left pleural cavity was filled with bloody fluid. A greyish white, board-like mass filled the anterior mediastinum. There were several plaques of tumour in the left parietal pleura and in the diaphragm. The liver was enlarged and stippled with grey. The spleen was enlarged and very pulpy. The kidneys were slightly enlarged; their capsules were thickened and infiltrated by firm greyish masses which invaded the kidney cortex.

Microscopic Analysis.—The mediastinal tumour was composed of large, atypical, lymphoid cells with irregular pale nuclei and scanty clear cytoplasm, surrounded by fibrous and adipose tissue. The meninges of both cord and brain were infiltrated by lymphoid cells. The normal structure of the bone marrow, spleen, and lymph nodes was obliterated by abnormal lymphoid cells, which broke through the capsules of the lymph nodes and invaded the surrounding tissues. The blood channels were filled with atypical lymphocytes.

Anatomical Diagnosis.—Leukosarcoma of lymph nodes, mediastinum, pleura, pericardium, diaphragm, liver, spleen, kidneys, choroid plexus, meninges and spinal cord.

CASE 4

Q.V., a forty year old male, was admitted on September 12, 1927, because of a slowly growing mass in the left buttock, first noted in July. The lymph nodes and spleen were palpably enlarged. There was a firm, tender mass, about the size of a grapefruit, fixed to the wing of the left ilium. The leukocyte count on admission was 45,800 per c.mm. Four days before death it was 70,000, with 55 per cent neutrophiles, 20 per cent neutrophilic myelocytes, 5 per cent basophilic myelocytes, 10 per cent myeloblasts, 5 per cent endothelial cells and 10 per cent lymphocytes. The patient died on September 24, 1927.

Autopsy.—The lymph nodes were moderately enlarged. The cut surfaces of those in the iliac region had a greenish tinge. There was a large, firm tumour, measuring 14 cm. in diameter, in the left sacro-iliac region. It infiltrated the surrounding muscle and bone, destroying a large part of the left ileum and bulging into the pelvic cavity as a rounded mass. The cut surface was of a greyish colour, mottled with green, and was friable. A smaller nodule of similar character was attached to the right iliac crest. The liver was enlarged and flecked with yellow. There were two round, light cream, friable nodules in the liver, beneath the capsule. The spleen was enlarged and pulpy. The kidneys were studded with small nodules similar to those in the liver.

Microscopic Analysis.—The primary tumour and the secondary nodules were composed of large irregular cells, the majority of which had oval nuclei and a muddy cytoplasm containing fine neutrophilic granules. Other

cells had polymorphic nuclei and contained many brilliant eosinophilic granules. A few cells showed basophilic granulation. The majority of the cells contained oxidase granules, some being so loaded with this substance that the nuclei were obscured. The tumour cells lay in cords and small masses supported by fine reticulum fibrils. The cells of the tumour masses infiltrated and destroyed the surrounding structures, growing between and into the individual tissue cells. The lymph nodes, bone marrow, spleen and blood vessels were loaded with myeloid cells.

Anatomical Diagnosis.—Myelosarcoma (chloromyelosarcoma) of ilium, liver, kidneys, spleen, bone marrow, and lymph nodes.

In these four cases there were tumour-like masses with metastatic nodules in distant organs. In the first case there was a marked tumorous enlargement of the abdominal lymph nodes in the neighbourhood of the pancreas, which had broken all bounds, invading the pylorus and pancreas. Cases 2 and 3 had large lymphoid masses in the mediastinum, which had invaded and destroyed pleura, pericardium and diaphragm, and had given rise to secondary deposits in the kidneys and meninges. Case 4 presented a large tumour in the gluteal region, invading and destroying the underlying bone and the surrounding muscle. At the beginning of the illness there were no symptoms pointing to a leukæmia, and even later, when the white blood count rose to 70,000, it was thought that the condition was one of osteosarcoma, with irritation of the bone marrow by secondary growths. The demonstration of oxydase and other granules in the tumour cells proved it to be a myeloid tumour, and the presence of secondary nodules in liver and kidney, together with the myelogenous infiltration of lymph nodes, spleen and bone marrow, place it in the class of the myelosarcomata.

In these four cases it seems justifiable to conclude that we are dealing with a malignant new growth with an escape of cells into the blood stream. The definite masses, invasion and destruction of surrounding tissues, and the tumour nodules of a like nature in distant organs obviously support the diagnosis of a malignant tumour.

Because of the association of these growths with a leukæmic state of the blood, the tumour nature of these cases has been doubted by a number of authors. Naegeli asserts that where a disease is manifested by a leukæmic blood a generalized systemic disease of the lymphatic or myelogenous apparatus exists, and he states that "There is no localized tumour with

leukæmia, but only a generalized leukæmic affection with here and there more strongly aggressive infiltration." In support of this view he argues that even in chronic forms of leukæmia the hyperplasia may in places overstep the bounds of the gland capsule, infiltrating the surrounding structures, and that in all cases there is a microscopic tumour-like proliferation around the vessel sheaths, particularly in the kidney and liver. Naegeli also contends that the fact that organs may be heavily infiltrated by leukæmic cells for years, without injury to the tissues, excludes anything in the nature of a tumour growth. Finally he says "The macroscopic picture must be considered the conclusive thing." Fraenkel supports Naegeli's views with similar arguments.

These opinions, while they may apply with some force in the case of an ordinary leukæmia, do not fit those types of cases described by Sternberg as leukosarcoma and myelosarcoma, which show massive tumours and gross secondary nodules, both of which invade and destroy tissue. Sternberg considers these cases as a peculiar type of malignant tumour with an overflowing of cells into the blood stream. He shows that these tumours present all the anatomical features of a new growth, and places side by side illustrations of mediastinal leukosarcoma and lymphosarcoma which are indistinguishable from one another. He claims, as do Paltauf and Müller, that the large infiltrating masses and the definite metastatic nodules in distant organs cannot be explained solely on the basis of a generalized lymphatic or myelogenous hyperplasia.

The features presented by the cases studied and by those reported in the literature compel one to agree with those who maintain that the condition is best described as a definite tumour growth. The appearance of large tumours before there is any change in the blood picture, and before enlargement of the lymph glands or spleen, which occurred in our four cases, cannot be readily accounted for on the theory of a generalized lymphoid or myeloid affection, nor can the appearance of secondary tumour nodules in the brain and testicle, (Askanazy, Müller, Foot and Jones), situations in which myelogenous tissue is normally lacking, be explained on this ground. It would seem, therefore, that the evidence is strongly in favour of

Sternberg's theory of a tumour process, and that these conditions can be best classified as leukosarcoma and myelosarcoma.

SUMMARY AND CONCLUSIONS

1. The gross and microscopic findings in three cases of leukosarcoma and one of myelosarcoma were studied and compared with the reported cases in the literature.

2. From the evidence presented by the observations on these four cases, it seems evident that the disease process (localized lymphoid or myeloid tumours with leukæmic blood) should be considered as a condition separate from the simple leukæmias and of the nature of true tumours.

I wish to express my indebtedness to Professor Oskar Klotz, at whose suggestion this work was undertaken, and who has assisted me with valuable criticism and advice.

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Who first practised percussion in this country (England) I do not know, but it was an Englishman who first noticed Auenbrugger's discovery, which he announced in 1761. Ronald S. Crane has recently brought to light the very interesting fact that Auenbrugger's book was introduced into England by Oliver Goldsmith, who wrote a review of it in the year of its publication—namely, 1761. Being himself a physician this he was qualified to do. Goldsmith gives an admirable abstract of the book, and concludes: "Such are the outlines of

this new discovery; whether it may be of use to society or not there is no necessity for me to pretend to determine; only this may be observed: that the lungs are often, in the most healthy state, found to adhere to the pleura, and in such a case I fancy the sound would, in that part, deceive the practitioner; however, I shall not pretend to set up my conjecture against his experience." The first French notice of it was the publication, in 1770, of a translation by Rozière de la Chassagne.—W. Hale-White.

FRACTURES PERTAINING TO THE MOTOR ACCIDENT

By G. A. RAMSAY, M.D.,

London, Ont.

THE improved highways of the Provinces tend to become speedways, furnishing a "thrill" for the irresponsible motorist and thus accounting for the majority of accidents. To a lesser extent, the confusion of congested streets contributes, especially to the juvenile casualties. Elsewhere, in construction, transportation and industry, the "safety first" slogan has worked wonders in bringing about the reduction of crippling accidents.

Certain features seem to be common to the fractures produced by motor accidents: they are the effects of direct force; they usually involve the large bones; they are frequently severely comminuted; they are more often compound than those fractures dependent on other etiological circumstances; they are marked by a severity of shock; they are frequently complicated by a severe degree of infection.

Since many of these fractures are compound, and potentially infected, the particular application of the principles of treatment suitable for injury of the soft tissues is essential. The general aim should be to reduce the incidence of infection by the removal of all soiled and completely damaged tissue which would otherwise prove a suitable nidus of bacterial growth. This should be done under full anaesthesia, with preliminary skin sterilization. Haemostasis is important and there should be as little handling as possible. First, a narrow skin margin is excised, then a wider excision of subcutaneous tissue is done; the frayed and loose tags of muscle are to be removed; when a slow oozing of blood is seen in the muscle wall, this indicates sufficiency. Fascial planes are followed to evacuate blood clot, and the bone is treated. Entirely loose spicules should be removed, and obviously contaminated portions excised by rongeurs. The periosteum is preserved with scrupulous care. If the protruding bone be entirely skinned of periosteum then it is excised up to the line of attachment of the periosteum, and the tube of the latter is tucked down along the axis of the limb.

The reduction of the fracture is usually attained by engaging the fragmented ends by angulation and then straightening them. No metallic fixa-

tives are allowed. The wound may be "bipped" and closed, or Dakin's drainage tubes may be placed in position and continued for a few days, and closure then effected. The choice of method is for individual decision. Drains left in for too long act as a foreign body, and when once the mass of blood clot is removed a vaselined gauze pack will suffice. External fixation is best effected by open splinting, and skeletal traction is applied wherever possible.

In a review of the statistics of such accidents, it would appear that certain conditions of fracture recur with sufficient frequency to deduce certain prevailing incidences of casualties to the pedestrian or passenger, or to the anatomical part involved. Thus, ten per cent of the fractures due to motor injury involve the skull and these more often happen to the adult pedestrian, who also shows a liability to fractures of the femur or tibia. On the whole, fractures of the skull are commoner in adults, whilst in children the femur is more frequently broken, though this general rule does not preclude the possibility that either age may exemplify a combination or a reversal of the two probabilities.

Should the adult pedestrian receive a head injury, this may vary from scalp contusions, with slight concussion, to the more grave fracture of the base. Most of these patients are brought to the casualty ward unconscious. The question of immediate importance is the extent to which the intracranial pressure of the cerebro-spinal fluid is disturbed, rather than any immediate assumption of text book analysis as to whether there be concussion, contusion, compression, or laceration of the brain. If we may estimate the intracranial pressure from the degree and combinations of variations in pulse rate, respirations, temperature, pulse pressure, shock, and the psychic state, then we are in a position to decide on procedure in treatment, whether it is to be expectant, or more radical by the operative measures of lumbar puncture or trephining. A further appreciation of the situation requires a recognition of possible complications, such as, scalp contusions or lacerations, skull fractures, depression or penetrations, and finally the major condition of intracranial haemorrhage.

It is suggested that hasty resort to spinal puncture in these cases of recent acute head injury is undesirable; also, that in cases presenting the picture of a gradually increasing intracranial haemorrhage without fracture of the base, that operation be advised when the rising pulse pressure reading approaches that of the decreasing pulse rate.

The adult who has an injury of the lower extremity generally has a comminuted fracture of the tibia. In such cases extension is best obtained by skeletal traction, using the Steinman pin and Thomas splint. In this type of fracture, fortunately, the periosteal attachments to the broken fragments suffice to form a tube along which a bridge of callus is formed. Should any fragments be detached from their source of nutrition, their removal may well be deferred till later. Clinical and x-ray signs show sequestration, since many of these loose infected fragments will be enclosed by callus and forever remain inert. In our series, we have also one in which the spine of the tibia was partially detached, but fortunately not completely, and the action of the crucial ligaments was not affected.

The child who has been run over usually suffers a fracture of the femur in its middle third, the line of cleavage being either transverse or a short oblique spiral. This should be reduced under anaesthesia, with retention in either plaster spica or Thomas splint extension. The overhead suspension of both legs, even for young children, is not so popular as it used to be.

Accidents to passengers are frequent. The driver of the motor vehicle generally suffers from shock, but may also sustain a crushing of the chest, with fracture of the ribs or sternum; sometimes also when the wheel is forcibly and suddenly twisted from his grip, injury occurs in the region of the elbow, marked by extensive comminution of the humerus or fore-arm, and laceration of the skin. The primary consideration in the treatment of such elbow injury is the future function of the joint. If the comminution of the joint be so severe that no motion may be expected, then it is to be immobilized in such a position as will be most useful in ankylosis, the angle most favourable being 110° for the left and 100° for the right, the forearm being rather more in pronation than in supination. On the other hand, if the injury does not jeopardize the joint, we are to follow these principles in treatment.

(1) Complete reduction of the deformity;

(2) immobilization of the limb in either right angled or acute angled flexion; (3) early partial active motion.

With regard to the first of these, we can recognize incomplete reduction by observing dissimilarity in the carrying angle, blocking of complete flexion or supination, or shutting off of the radial pulse. The occurrence of any one or all of these signs will indicate a further effort at replacement.

With regard to the second principle, we have been enjoined to put up all elbow injuries in acute-angled flexion. However, there is one consideration worthy of thought, that of the supra-condylar fracture. Our studies have shown us that when the humerus is displaced forward an attempt at reduction in acute-angled flexion only jams the elbow angle, and the displacement at once recurs in spite of all efforts at retention. In such cases we have found that the right-angled position is to be preferred. This is secured by the Jones abduction splint, with downward traction on the fore-arm. Movement in such cases is to be deferred until there is good plastic union, usually for two to three weeks. The elbow injury, retained in the acute-angled position, needs no splint except a figure of eight bandaging with flannel bandages and a collar and cuff sling. This can be gradually increased in length after ten days and the patient encouraged to extend the elbow voluntarily within the increased range permitted, so long as no reaction occurs.

The injuries to the passengers usually involve the hips, pelvis and knees. The back-seat passenger is specially liable to dislocation of the hip. This is favoured by the fact that at the moment of sudden arrest of forward velocity the passenger, who is seated with his knees flexed and thighs abducted, is propelled against the forward seat and the knee then twists inward; the head of the femur is then placed opposite the lowest and weakest portion of the capsule and acetabulum and is easily forced into the position of posterior luxation.

The correction of this disability requires the following: deep anaesthesia; fixation of the pelvis against a hard flat surface; an outward pull on the affected thigh; counter extension of the whole pelvis; upward lifting of the head femur by leverage action; elevation of the flexed knee and a subsequent swing into adduction and extension.

These requirements can be accomplished by the operator and two assistants, each of whom has a long swathe about his own body and the

appropriate part of the patient; when all "put their backs into it" the reward is the satisfying "chuck" that means re-position of the head. The after-treatment calls for rest for three days until local reaction has subsided, then active motion is encouraged, and the patient can be permitted to walk in a caliper splint in a week's time.

Spinal injuries constitute a small percentage of all motor injuries and are brought about by the shock which throws the seated passenger upward, the head striking the ceiling and transmitting the force to the spine; or are caused by a somersaulting car, landing wheels up and crushing the bent-over seated passengers. In the former case the cervical spine is fractured or dislocated; in the latter, there appears to be a greater liability to compression fractures of the vertebrae. These compression fractures are frequently unsuspected, but whenever localized pain and tenderness with spasm of the muscles persist, and are increased by downward pressure on the head, then a careful neurological examination may indicate signs of root or cord irritation. Radiological examination is confirmatory, but is only of value if taken in the lateral position.

The most serious injuries are, however, those to the pelvis, with fracture of the rami, the symphysis, the sacro-iliac joints, or central dislocation of the head of the femur possibly associated with complications of bladder, urethral, or rectal injury, and the subsequent occurrence of pelvic peritonitis or cellulitis. The mechanism of this type of fracture is a lateral crush, and the person on the down side in a ditching mishap usually receives fractures when his seat mates are catapulted against him. A head to side collision may do the same thing as does also the impact of a locomotive against the side of the car in the case of a crossing mishap.

Treatment of fractures of the pelvic girdle consists in slinging the whole body from an overhead frame by three swathes, one behind the pelvis and one for each thigh. A pulley weight counterbalance will make adjustments easy and permit nursing care without discomfort. It is to be noted that the pelvic swathe must not constrict, otherwise the patient complains bitterly. Anterior cross strapping with adhesive will hold the swathes together sufficiently well.

The front seat passenger has a special liability

to knee injuries through striking the dashboard. We have two records of fracture of the femur at the lower epiphyseal line, with forward dislocation of the lower extremity, and, in one case, protrusion through the skin. One of these had also a double fracture of the leg bone, transverse in the lower third, though how the force acted to do this we are unable to explain.

The patella is out of the way in the sitting position and is seldom injured. In one especially tall man the tibial tubercle was cracked transversely and considerable disability resulted.

In concluding, we would stress the fact that the seriousness of these crippling injuries is greatly increased by the generally inadequate first aid measures applied at the roadside, so that when the patient arrives at the hospital, the degree of shock and the subsequent additional trauma due to transportation have greatly lessened the prospects of future usefulness of the injured limb. Compare this with the experiences of the late war. In 1915, 85 per cent of fractured femurs were fatal. Thereafter, this mortality was reduced to 15 per cent, in 1918, largely by the perfection of efficient front line first-aid treatment by stretcher bearers and regimental medical officers who had learned the boon of the Thomas splint when used in the forward aid-posts.

Again, the law requires that each railway carriage be provided with a box of emergency tools, and yet railway accidents constitute a minority of highway injuries. Would not the Department of Highways be justified in supplying emergency kits that will provide the best front-line facilities for first aid to motor accident casualties? It would not cost much to provide such at strategic points, readily available to the highway patrol officers, who might likewise be well trained in the application of emergency splints and other first aid measures. Certainly, every ambulance driver should be required to carry a sufficient outfit to provide safe carriage of the patient, and it is not assuming too much to say that the St. John's Association would arrange to train the personnel of establishments operating ambulances.

We respectfully present these suggestions to the Honourable the Minister of Highways, in the hope that human wastage may be diminished by perfecting the co-operation that is essential to the accomplishment of this ideal.

Case Reports

TRAUMATIC ASPHYXIA*

By H. M. YOUNG, M.D., C.M.,

Iroquois Falls, Ont.

D. W., aged 25, a previously healthy but slight man, was injured on Monday, October 3, 1927, in the paper mill, while engaged in the spreading of felts preparatory to the starting up of the machines. As he was finishing his work on the second press this portion of the machine was accidentally thrown into motion, and in endeavouring to save himself he jumped to seize an overhead bar. This he missed and he fell against one of the larger rolls of the third press. The force of his impact ripped the felt from this roller, which wrapping itself around him pulled him into the machine and between two of the smaller rolls. There he stuck with his head, left arm, part of his chest and abdomen, which had passed between the two rollers, on one side, and the remainder of his body on the other side.

It took about ten minutes to release him by raising the upper roll. At that time he was unconscious, was black in the face, and bleeding from the nose. A very few minutes later he regained consciousness, but was dull and dazed. He did not complain of blindness. First aid was administered, and he was removed to the hospital.

Physical Examination.—By this time he was quite conscious and answered questions readily. A moderate degree of shock was evidenced by the slightly accelerated low tension pulse and vomiting. The vomitus contained fragments of clotted blood mingled with undigested food. He complained of considerable pain all through his body, but more particularly in the region of his left scapula which was fractured. There was a friction burn overlying the left zygomatic arch, but the most striking feature was the dusky cyanotic appearance of his face. In addition, his features were swollen and oedematous, so much so that, although he was well known, it was difficult at first to recognize him.

* Read at the annual meeting of the Ontario Medical Association, Hamilton, May, 1929.

His eyes were opened with difficulty on account of the swelling and discolouration, but upon examination very marked subconjunctival haemorrhages, covering practically the whole area of the bulbar conjunctivæ, were evident. The pupils were symmetrical and equal, reacting normally to light and accommodation. There was no retinal haemorrhage.

On closer examination the dusky cyanosis was seen to be due to a diffuse crop of haemorrhages into the skin, both discreet and confluent, typical of petechiae. This condition involved the whole face, scalp, ears, and neck, and extended down over the shoulders and to the left side of the chest in the pectoral region as far as the level of the second costal cartilage. A denser crop of the petechiae marked very definitely the course of the superficial temporal veins on both sides. Petechiae were present on the lips and extended well over the buccal mucous membrane. The nasopharynx contained streaks of clotted blood, but no active bleeding was seen. There was no bleeding from the ears, and hearing was normal.

The pulse was quite regular and of fair volume and its rate was 96 per minute. His arterial blood pressure was low, being 110/65.

The respirations were quiet and not unduly accelerated, and his lungs were clear, no râles being present.

The abdomen was retracted and rigid, but moved freely on respiration. There were marks of bruising from the folds of felt. The tenderness which was present over the whole abdomen was quite superficial, and was judged to be due to muscular injury, as there was no other sign present which might indicate intra-abdominal injury. A small friction burn of the third degree was present over the left anterior superior spine.

His legs were uninjured and there were no signs of paralysis.

A lumbar puncture was not done.

Progress.—On the third day he began to expectorate dark reddish black blood. The cough, however, was only slight, even though a considerable number of moist râles had developed throughout his chest. There was no elevation

of temperature sufficient to indicate pulmonary infection. The abdominal tenderness was subsiding rapidly.

By the end of a week the petechiae had almost disappeared, the oedema of his face had disappeared; and there was a large flaky desquamation in progress over the skin of his face and neck. The subconjunctival haemorrhages were more brilliant than ever. The bloody expectoration was still present although the cough by this time was negligible.

The cough, expectoration, cyanosis were entirely gone by the end of the second week and he was commencing to use his left arm, although the scapular strapping was still in place.

COMMENT

As you will no doubt agree, the typical picture of traumatic asphyxia, as above described, is very striking. The condition was first described following the riots and panics in Paris during the eighteenth century. Numbers may be stricken with this condition in such panics where prolonged compression of the abdomen and thorax is a factor. Robertson, of Toronto, reported a group of cases resulting from a stampede following the cry of "Fire" at a moving picture theatre. Most of the cases reported, however, have been the result of some compressing or slow crushing force. In addition, an interesting case of a patient having two attacks of typical traumatic asphyxia induced by epileptic seizures has been reported by Parker Symes.

Before proceeding with any discussion of the present case it may prove interesting to recall very briefly certain anatomical and physiological factors which seem to have a bearing on this condition. The orifice of the superior vena cava at the right auricle is unprotected by a valve, and likewise the venous radicles which flow into the superior vena cava are in the main devoid of competent valves. Valves of a rudimentary type may, however, be found in such vessels as the external jugular and the superior thyroid veins. This condition, therefore, suggests very strongly that gravity is the main force which ensures the adequate return of the blood to the heart from the upper segment of the body.

In direct contrast, the anatomical findings in the veins below the level of the heart is strik-

ingly apparent, for the veins are richly endowed with valves. Obviously, in man's erect posture, the action of gravity is antagonistic to the normal return of blood to the heart, but nature, in her efforts to overcome this force, provides the veins with a series of step valves, which, together with the pump-like action of the diaphragm, ensure an adequate return of blood to the heart from this larger segment of the body.

When one attempts to analyse the type of violence which produces this condition it is interesting to note that the intensity of the symptoms and signs exhibited seems to have a distinct relation to three main factors: (1) the intensity of the force applied; (2) its duration; (3) the active effort made by the individual to resist the compressing force.

In considering the intensity of the force, the case here reported conveys some interesting information. The rapidity with which the force was applied in this instance is not clear, as the machine was just thrown into motion when the accident happened. A conservative estimate of the speed of the machine at the time would be about 100 feet per minute. The compression to which this man was subjected can, however, be measured more accurately. The clearance of the rolls between which he was drawn, without allowance for felts, is 5.75 inches. Caliper measurements of the patient taken after recovery showed the biparietal diameter of his skull to be 5.71 inches (14.5 cm.). The diameter from the vertebral spines to the sternum at the level of the second costal cartilage was 6.3 inches, and at the ensiform was 6.3 inches on forced expiration and 7.875 inches on deep inspiration. Allowing for the bulge of the spinal muscles and curves of the ribs posteriorly, the antero-posterior diameter of his chest was compressed by approximately one inch beyond the position of forced expiration and nearly two and one-half inches from the position of deep inspiration. Moreover, the chest was fixed in this position for approximately ten minutes.

Although, a consideration of such a patient's active effort is somewhat speculative, nevertheless some interesting factors seem apparent. Extreme fear and the need for effort at self preservation are at once induced, probably before the actual compression is instituted. For

the brief period before consciousness is lost, violent muscular activity is induced. Respiration receives a powerful stimulus, both emotionally and by the increased CO₂ output resulting from the muscular effort. Because of the extreme degree of fixation of the thoracic wall and the consequent inability of the accessory respiratory muscles to act in the presence of the compressing force the diaphragm alone remains relatively free to carry on respiration, and it is possible that a relative oxygen starvation results. With such powerful sources of respiratory stimulation, it is reasonable to expect that the diaphragm, in response, is thrown into unusually violent and rapid contractions. Its pump-like action on the blood stream would therefore be of some consequence. Moreover, the compression itself would tend to diminish the blood volume in the splanchnic area, apart from a general vaso-constriction which is presumably associated.

Bearing in mind the rapidity with which these opposing forces meet, the particular anatomical structures, and, perhaps, the physics of fluids, it is not impossible to imagine a sudden displacement of blood volume, both mechanical and physiological, to the upper segment of the body faster than the heart can propel it through its proper channels. If this is so, a forceful regurgitation of blood through the superior vena cava would seem inevitable with a sudden rise in venous pressure. The production of such an intense crop of petechial haemorrhages, strongly suggests such an occurrence. The pathological evidence available demonstrates the formation of petechiae to be due in some instances to an intense diapedesis and in others to an actual rupture of the vessels. The epistaxis and haemoptysis which occur are undoubtedly due to the latter. It is interesting to note that a tight collar-band or hat band has in some instances provided sufficient counter-pressure to prevent the formation of petechiae. This observation probably provides us with a clue to explain the rarity of intracranial haemorrhage, as shown post mortem and by lumbar puncture. Presumably, the rigid cranium and spinal fluid provide the necessary support to the veins in this locality.

Clinically, the most constant and characteristic features of this condition are the subcon-

junctival haemorrhages, the periorbital ecchymosis, and the dusky cyanosis or "masque ecchymotique" of the French. Temporary blindness, unconsciousness, epistaxis, and haemoptysis are usually present in addition. Minute haemorrhages may occur on the retina and on the tympanic membranes. Intestinal bleeding does not seem to have been encountered in any of the reported cases. The blood pressure is usually slightly low, probably due to the resultant shock. Lumbar puncture demonstrates the absence of blood in the spinal fluid in uncomplicated cases.

The complications are few, bronchitis and broncho-pneumonia being the only ones to be feared. The greatest danger lies in the occurrence of associated injuries. Fracture of the skull, however, is rare, as force is seldom applied to this region. Fractures of the ribs are common, and, when complicated, may prove serious. Intra-abdominal injuries have been known to occur.

The diagnosis should not be difficult. Because of the subconjunctival haemorrhages, the periorbital ecchymosis, the bleeding from the nose and sometimes the ears, the condition is usually confused with a fracture of the base of the skull. One can however, occasionally save a lot of worry if petechiae can be demonstrated.

The prognosis in uncomplicated cases is good, both as to life and vision. Optic atrophy has been reported as an unfortunate, but infrequent, sequela. Less severe interference with vision probably does occur, but the lack of accurate knowledge of the prior state of vision in some of the cases at least makes evaluation of the findings difficult. In the case now reported a very moderate hyperopic astigmatism present before the accident remained unaffected at a subsequent examination by his oculist.

The fatal cases reported are usually complicated by severe associated injuries or infection, most frequently pulmonary.

The treatment can be briefly summarized as follows. Efforts must be directed first toward the re-establishment of respiration by stimulants and artificial respiration. Shock must be combated, the lungs protected from infection, and appropriate treatment given for any associated conditions.

A CASE OF SUBACUTE BACTERIAL ENDOCARDITIS*

By J. P. DAVIES, M.D.

Huntsville, Ont.

Endocarditis, applying the word without any effort at classification, is a condition which we all see very frequently. On questioning a patient or members of the family for the first time, we often feel reasonably certain, in our own minds at least, that we can date the beginning of the endocarditis back to a particular illness. In other cases however the origin may seem more or less vague.

In the case of this patient, whom I wish to present to you, the original illness and subsequent developments or complications followed each other in what one might term an orderly procession. The history of the case is as follows:—

Personal History.—R. D., a girl, eleven years of age, had previously seemed to be about as healthy as the average girl of her age. However, she had had albumin in her urine on several occasions, but it always cleared up and the condition was looked upon as a temporary one. When albuminuria was present there was also oedema in the loose tissues around the eyes. This oedema was at its worst in the morning and improved towards evening. It lasted approximately seven to ten days, and then disappeared completely. Recurrences were about six months to one year apart. She had had all the ordinary children's diseases. The only additional condition that might be deserving of mention was that in September of 1926 she developed a "trench mouth." This involved especially the six front upper teeth, which presented a solid mass of infection. Coincident with this, albuminuria was present, as was also oedema around the eyes.

Family History.—There was nothing worthy of record in regard to past illnesses.

Present Illness.—On July 22, 1928, I visited this patient and elicited the following information, *viz.*, that two days previously she had fallen, causing a very slight abrasion on the right elbow. The abrasion could easily be covered with a small five cent piece, and seemed

to have barely penetrated the outer skin layer. No iodine or antiseptic of any kind had been applied to it. At the time of my visit the patient was in bed with a temperature of 105, $^{\circ}$ a pulse of 140, and respirations, 40. There was marked infection of the right forearm. The patient said that the area of redness was spreading very rapidly. Under the usual aseptic precautions the area involved was lanced at once, two incisions of approximately three inches in length being made. These incisions did not bleed very freely. Hyperæmia treatment was then employed, the arm being immersed in a hot solution of boracic acid, which was kept at a fairly constant temperature by the frequent addition of hot water. This treatment was kept up day and night. The first temperature taken after lancing showed a fall to 103, $^{\circ}$ with a corresponding fall of the pulse and respirations. In spite of treatment, however, the area of redness kept spreading around the arm and towards the shoulder, accompanied by a rise of temperature to its former level. Seven incisions, all about three inches in length, were made in thirty-six hours, and still the area of inflammation showed not the slightest sign of abating, with the exception of a fall in temperature following all incisions. At this stage the advisability of amputating the arm at the shoulder joint had to be faced. It looked very much as if this would have to be done in view of the virulence of the infection. Possible life minus one arm, or probable death if amputation was not performed, seemed to be the two choices. Yet one did not wish to be too hasty, and, therefore, although the case was urgent, it was agreed that we would wait for twelve hours longer. I felt that this additional length of time would unquestionably give the patient every possible chance to overcome the infection and thus save her right arm. Within the twelve hours just mentioned the patient apparently seemed to have won the fight. The temperature took a real fall to 100, $^{\circ}$ with the pulse and respiration following a similar course. The following morning the temperature was only 99.1, $^{\circ}$. The inflammation by this time had actually started to recede, and things looked brighter. The following day the temperature was subnormal, with the area of redness fading fast, and there was every indication of a successful termina-

* Read at the annual meeting of the Ontario Medical Association, Hamilton, May, 1929.

tion to the illness. Things progressed very nicely during the next ten days. I felt that my services were no longer necessary and the case was turned over to a local Victorian Order nurse, who continued dressing the incisions until they were entirely healed. She also checked up the temperature, pulse, and respirations daily. In a week's time she too left the case, feeling that there was nothing further to be done. Several days later, the nurse was passing this patient's home and by chance decided to look in and see if everything was still satisfactory. The nurse telephoned me on August 19th that our patient seemed to be all right, except that she had a temperature of 99.2° and a pulse of 135. From this date until the present time the temperature has varied from slightly subnormal to 100° , 99.1° or 99.2° being about the average. This temperature of course fluctuated up and down, being lowest in the morning as a general rule. On one occasion the temperature rose to 102° but at this time the patient had a common cold. She took longer than usual to recover, but, once she did, her temperature dropped to its old average of approximately 99.2° .

The pulse is quite regular and usually of good volume but very occasionally becomes thready and rather hard to count. The rate has been extremely variable, ranging from 78 to 160, with an average rate of about 130. In twenty-four hours the pulse rate varies on an average about twenty-five beats. On three occasions the rate dropped from 150 to 85 or 90, but was back well over 100 the next time a count was made. A pulse rate of less than 100 has certainly been the exception to date.

The patient is very well nourished, but is cyanosed at times and has had petechial rashes, as well as some oedema about the eyes. There has been no oedema about the ankles and no dyspnoea. She has a tendency to sigh a good deal, and on taking an unusually deep breath the pulse slows down noticeably for ten to fifteen seconds, but speeds up again immediately. This slowing is undoubtedly due to better aeration for the moment.

The tonsils show no evidence of disease. The teeth are in good condition. The chest is normal. The heart is not enlarged. There is no thrill, but the beat is easily palpable, and the apex beat is easily visible. The heart

seems to be working at top speed continually. No murmur has been heard to date, though on two or three occasions there has been a suspicion of a faint mitral regurgitation, this, however, is very uncertain.

The blood pressure is normal, and has been so all through the illness.

Diagnosis.—There is certainly no doubt that an endocarditis is present. One might question as to what type it belongs to, but it must be either a malignant or ulcerative type, or a subacute bacterial type. In the ulcerative type one would expect to find a fairly well marked murmur in a case which has been active for a period of nine months. This is not the case, however, and this, together with the fact that it seems almost a foregone conclusion that the organism that caused the septicæmia has gained entrance into the general blood stream and produced the present endocarditis, leads me to classify the case as subacute bacterial endocarditis. One might think of rheumatism which plays so prominent a part in cardiac cases, but here we lack any history which is even suggestive. The rapid pulse causes one to be on the lookout for hyperthyroidism, but why the temperature?

CLINICAL LABORATORY REPORTS IN THE CASE OF R.D.

Basal Metabolism Rate: 5 per cent.

Blood Chemistry Report: urea nitrogen, 16.5; creatinine, 2.37; blood sugar, 0.112.

Blood Picture: white blood cells, 9,100 per c.m.m.; red blood cells, 5,064,000 per c.m.m.; haemoglobin, 70 per cent; polymorphonuclears, 42; large lymphocytes, 23; eosinophiles, 2; small lymphocytes, 30; mast cells, 2; transitionals, 1.

Blood Culture: negative after 48 hours.

Urine Examination (first specimen): specific gravity, quantity not sufficient; microscopic, many epithelial cells; an occasional leucocyte; reaction, neutral; albumin, very slight trace; sugar, negative; acetone and diacetic acid, negative.

Twenty-four Hour Specimen: specific gravity, quantity not sufficient; microscopic, an occasional red blood cell; a few epithelial cells; reaction, acid; albumin, very slight trace; sugar, negative; acetone and diacetic acid, negative.

Fluid intake: 1750 c.c.

Amount voided: 750 c.c.

X-ray: negative; no cardiac enlargement.

Electrocardiogram: shows nothing unusual.

Prognosis.—The patient does what she is told to do, and in addition she has youth on her side, and these points are in her favour. On the other hand, the dangers which may beset her seem to be very great. The condition has already lasted for a considerable time, and there has been no improvement in the endocarditis to date. There is always the possibility that cardiac decompensation may occur and in that event we should expect a fatal termination. Such a case is also always in the gravest danger from complications. Scarlet fever, measles, etc., might easily be fatal. The prognosis must be very guarded, yet, at the same time, the case does not seem to be hopeless.

Treatment.—General measures hold good here. Rest in bed undoubtedly holds first place and the patient must so remain until the temperature and pulse are normal and the blood free from bacteria. Diet should be light, bland, and easily digestible, and the patient should have good bowel eliminations. It is well to keep a girl of this age occupied and contented if possible.

Seven grains of diuretin were given three times a day, when oedema was present around the eyes, with good results. Tr. digitalis was given rather carefully, in doses of 5 minims three times a day, and this was kept up for one month, but there was no appreciable result. Sodium salicylate was used in doses of 80 grains daily, with 160 grains of sodium bicarbonate. This also had no effect.

Following the apparent failure of digitalis and the salicylates to help, arsenic in the form of Fowler's solution has been used, but has not produced any improvement.

A vaccine was not used because most of the literature on this subject records that vaccines and antiserums have as yet shown no definite evidence of their value. With a living organism free in the circulation it is hard to understand how a vaccine could have any possible value.

In conclusion, I might add that although the patient has been in bed for nine months it appears that this is only a beginning for her.

SUCCESSFUL CLOSURE OF SPINAL MENINGOCELE, FOLLOWED BY SEVERE REACTION*

By S. A. WALLACE, M.D., C.M.,
F.R.C.S. (EDIN.),
Kamloops, B.C.

Elizabeth McM. when first seen was five weeks old and in rather an emaciated condition owing to improper feeding. A spinal meningocele was present in the lower sacral region, about the size of a large olive. The opening into the sacral canal admitted the tip of a finger. The sac seemed subcutaneous and was tightly distended when the child cried. Owing to the undernourished condition, it was decided to try to keep the meningocele reduced by a pad and strapping, and to wait until the child put on more weight. At eight months her general condition was fairly good. The meningocele had increased to the size of a walnut, and the covering skin was thin and discoloured. Fearing rupture of the sac, operation was decided upon on May 21, 1929.

Under light ether anaesthesia, with the buttocks raised, a curved transverse incision was made just below the most prominent part of the meningocele and the skin dissected off the sac. When the meningeal sac was opened there was considerable shock and respirations became very shallow and then practically stopped for a few moments. The sac was quickly transfixated and ligated at the base and the lateral edges inverted with overlapping sutures. The skin was closed with dermol and a collodion dressing applied. On returning to the ward, the buttocks were raised, as there had been some loss of spinal fluid during the operation, and a subcutaneous saline and glucose was administered.

The next morning the child was very restless and refused any nourishment. The breathing was rapid and shallow; pulse 160; temperature 105.8°. The anterior fontanelle was bulging and tense. A spinal puncture was performed and a pressure of 22 mg. was found, with turbid fluid which was allowed to drain until the pressure was 6 mg. The cell count was 5440 per c.mm., with polymorphonuclear cells predominating. Cultures of the fluid proved sterile.

* From the practice of Drs. Irving, Wallace and Ireland, Kamloops, B.C.

On May 23rd, using the mother as a donor, a direct transfusion of about 100 c.c. was given, using the syringe method, into the internal saphenous vein at the ankle. The fontanelle was not so distended as the day previous. After the transfusion the child improved and took small amounts of milk.

On May 24th, a slight leakage of spinal fluid was seen at the wound and the buttocks were raised higher. The child was fussy, but taking nourishment better and the general condition was improved.

Improvement was now quite steady. At times the temperature was elevated to 102 and 103 degrees, with occasional leakage at the wound. On June 9th the child was discharged with normal temperature and the wound firmly healed. No bulging was seen at the site of the meningocele when crying or straining.

The interesting features of this case were the post-operative hyperpyrexia and high cell count of sterile spinal fluid.

About the middle of September, nearly four months after the operation, the child was examined and no signs of any bulging could be seen and the opening into the sacral canal seemed firmly covered by dense tissue.

A CASE OF COLLOID CARCINOMA OF THE PERITONEUM*

By F. W. HART, B.A., M.D.,

Indian Head, Sask.

On May 23, 1928, A.B., aet. 59, presented himself for examination. He complained of weakness, indigestion and "gas in the stomach". He said his abdomen had been getting larger during the last two years.

Personal History.—Occupation, farming. He had never used alcohol in any form, and had always had good health except that twenty-five years ago he was in bed for two months with alternating diarrhoea and constipation.

Examination.—He appeared to be younger than his age. His teeth were in bad condition and he had extensive pyorrhœa. The respiratory and cardiovascular systems were normal; abdomen was soft and slightly distended. He had double

inguinal herniae; the left extended to the scrotum and the right just through the ring. The reflexes were normal. Rectal examination, negative.

Laboratory Reports.—Urine: specific gravity 1030, sugar negative, albumin negative; microscopically, large amounts of phosphates. Blood: white blood cells 10,560; red blood cells 2,950,-000; Wassermann test, negative.

Röntgenograms of the chest and of the abdomen showed nothing abnormal.

Progress.—The teeth were removed under ether anaesthesia. After this he became weaker and much thinner. The abdomen increased in size. On June 12, sixty-four ounces of straw coloured fluid were aspirated, which was not blood stained. Dr. Frances McGill, Provincial Pathologist, gave this report on the fluid: "Specific gravity, 1015; contains a large amount of albumin; no tuberculosis or other organisms present; contains a few white and a few red cells."

A few days later the left leg began to swell and abdominal distress and nausea became more pronounced. Almost daily he vomited a dark brown fluid having a bad odour. His temperature had been normal throughout; his pulse ranged between 90 and 110. The bowels were loose. He developed a cough with a large amount of greenish expectoration.

He was put in a sun balcony and given iron and arsenic hypodermically. Towards the end of June he began to show some improvement. The vomiting was less, the bowels were more normal, and the appetite improved. At this time the blood showed: white blood cells 3,200; red blood cells 3,930,000. The pulse ranged between 70 and 80. He was eating and sleeping well, and his general condition was much better. Signs of fluid in the abdomen could be elicited. There was slight indication of a mass in the left lower abdomen.

Differential Diagnosis.—Tuberculosis, cirrhosis of the liver, and carcinoma were considered. In favour of tuberculosis was the history of gradual onset, the cough, the presence of fluid in the abdomen, and the apparent improvement in his condition. On the other hand, the age of the patient, the absence of fever and the failure to detect bacilli were against tuberculosis. In favour of cirrhosis of the liver was the ascites. On the other hand the liver was

* Read before a meeting of the Fellows of the American College of Surgeons, on March 12, 1929, at Regina, Saskatchewan.

not diminished and the usual etiological factors were absent. In favour of malignancy was the age, but against it was the absence of early loss of weight and the apparent improvement in his condition.

Toward the end of July, he was admitted to the sanatorium at Fort Qu'Appelle. He was discharged a month later. Dr. C. H. Andrews sent this report: "Physical examination of his chest showed no impairment of resonance or movement and no moisture was heard. The abdomen was distended with fluid and a small hard mass was ballotable just to the left of the umbilicus. The liver could not be palpated and no large glands were felt. Stereograms of the chest showed nothing abnormal, except some haziness of the right base. X-ray of the stomach following a barium meal showed this organ and duodenum to be normal in outline and the stomach appeared to be emptying normally. A barium enema showed marked constriction with smooth borders extending over about three inches along the bowel at the junction of the sigmoid and descending colon. There was another stricture, similar in appearance, about the mid portion of the transverse colon, and a small one in the ascending colon just below the hepatic flexure. They did not appear to be due to spasm and did not alter when manipulated under the fluoroscope.

Injection of the fluid obtained from the abdomen into a guinea-pig gave no evidence of tuberculosis and the intradermal injection of one-tenth of a milligram of tuberculin did not result in any local or constitutional reaction.

The blood urea nitrogen was 20 mgm., and the creatinine was 2 mgm. per 100 c.c., just slightly above the average. The urine contained a trace of albumin on occasions.

Electrographic tracings were normal.

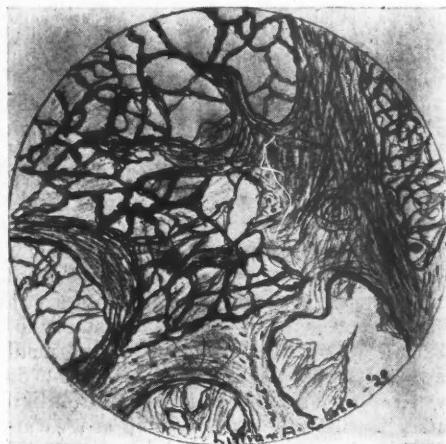
It appears fairly conclusive that the condition is not a tuberculous one. We regret that we were unable to make a definite diagnosis in this case."

He returned from the sanatorium on August 31st, and from that date until his death on January 16th I aspirated about seven quarts of fluid from his abdomen every week. He lived about seven miles out in the country and if for any reason he could not come to my office for a few days over the week he had considerable distress.

The mass in the abdomen became large and was extremely hard to the touch. Masses appeared in the upper left abdomen. He died on January 16, 1929.

Necropsy Report.—On opening the abdomen the hard tumours that was felt proved to be the omentum. It was a very hard, contracted, cartilage-like mass. The suspensory ligament of the liver was also a hard mass. The kidneys were normal. The spleen was contracted. The intestines appeared to be normal. The parietal peritoneum, especially toward the lower part of the abdomen, was covered with thick, soft growths resembling sago pudding (Boyd).

Pathologist's Report (by Dr. Frances McGill) —"Mass from abdomen. This is a colloid cancer. It is a mucoid gelatinous mass which is really not colloid material. In areas it is almost impossible to find any cells as they had been displaced by the mucoid material."



Microscopic appearance of the colloid carcinoma

French¹ states that primary carcinoma of the peritoneum is rare and is usually not associated with ascites. If this case was secondary I cannot tell where the primary growth was. Adami² says that the cells of the adenocarcinoma while retaining the power of forming mucus are unable to excrete it properly, with the result that it becomes heaped up in the cells to such an extent that they become greatly distended and eventually die. Whole alveoli may be composed of more or less inspissated and fused cell-bodies. The growth filled with modified mucus presents a massive translucent appearance. So extreme may be the condition that only here and there

can any alveoli be found showing relatively healthy cells.

Boyd³ states that this so-called colloid degeneration is more apt to occur in cancer of the intestinal tract. Metastases, when they do occur, tend to be of the same nature.

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Retrospect

THE ARTHRITIDES*

BY L. C. MONTGOMERY, M.D.,
Montreal

Owing to the limited time allowed me I shall confine myself to a review of the work that has been done during the past year.

There has undoubtedly been an increase in the interest shown in chronic arthritis during the past year. Some writers feel that it is about to take its place as one of the great chapters of medicine beside tuberculosis and syphilis. A movement looking to its control has been put under way in twenty-four countries, under the title of "La Ligue contre le Rhumatisme." In the United States there is "The American Committee for the Control of Rheumatism." The latter has taken upon itself the preparation of a so-called "Primer," setting forth the salient facts relating to arthritis for lay and medical persons alike, together with some therapeutic principles intended as a guide in treatment. Other steps pending are provision for better instruction in medical schools; extension of information through medical society meetings; inauguration and co-ordination of research; and, finally, some attention to standardization and co-ordination of treatment. It is felt that the magnitude of the problem will preclude dramatic progress, but there can be no reasonable doubt now that the outlook of most of the medical profession towards arthritis will be significantly widened in the not distant future.

Two groupings may be made.

CLASSIFICATION

1. Proliferative type
Atrophic "
Rheumatoid "
Infectious "

These represent an infectious process. The primary change is an inflammatory reaction of the synovial membrane. It is called atrophic because the dominant end-picture is atrophy.

* Read at the sixtieth Annual Meeting of the Canadian Medical Association, Montreal, June 19, 1929.

2. Degenerative type
Hypertrophic "
Osteo-arthritis "
Non-infectious "

These represent a non-infectious process. They may be due to senile changes comparable with those of arteriosclerosis and chronic interstitial nephritis. There is primarily a degeneration of joint cartilage. Called hypertrophic because hypertrophy is the dominating end-picture.

Examples of the first general group:

(a) Chronic infectious arthritis referable to foci of infection.

(b) Specific arthritides; here the causative organism is known (tuberculosis, syphilis, surgical joint conditions due to staphylococcus, streptococcus, pneumococcus, meningococcus, etc.).

(c) True arthritis deformans, considered by some to be a chronic progressive polyarthritis of unknown origin but by the majority to represent a severe form of focal infectious arthritis.

Examples of the second general group:

(a) Arthritis of the menopause.

(b) Degenerative monarticular arthritis (morsbus coxae senilis).

(c) Senile arthritis.

English writers recognize a third group, "Unclassifiable varieties"; 13 per cent of their cases fall under this heading.

SYMPTOMATOLOGY OF TYPICAL CASES

Proliferative (Infectious)	Degenerative (Non-Infectious)
1. Age of onset, 30 to 40 years.	1. Age of onset, 50 to 60 years.
2. Weight, normal or below normal.	2. Obesity common.
3. Haemoglobin percentage is low.	3. Haemoglobin percentage is normal.
4. Foci of infection usually present.	4. Foci usually absent; affection may be endocrine in character.
5. Apt to be migratory.	5. A localized process.
6. X-ray shows narrowing of the joint space.	6. X-ray shows lipping and exostosis.
7. There are proliferative changes.	7. There are degenerative changes.
8. Special sign is fusiform finger joints.	8. Special sign is Heberden's nodes and grating of joints.

It is well recognized that a combination of the two groups may be present in the same person.

STATISTICS

In Berlin disability from arthritis is between three and four times greater than that from tuberculosis. In Sweden arthritic disability stands first on the list of diseases causing permanent pensionable invalidity. Pemberton and Pierce,²⁸ in a study of 1,100 cases, found that: (1) Women predominated in the proportion of two to one. (2) The age of onset was for women, 41 to 50 years; for men, 36 to 40 years. (3) Exposure played somewhat of an etiological rôle among men, as was found during the late war. (4) The joints involved in order of frequency were the knees, hands, spine, shoulder. (5) The sites of focal infections in order of frequency were: dental, 54 per cent; nose and throat, 26 per cent; genito-urinary, 12 per cent; gynaecological, 1 per cent. (6) Heredity played an unexpectedly large rôle. (7) Disturbances of the nervous system were revealed in surprising frequency (8) The blood pressure tended to be low.

MORPHOLOGY

Nothing of great significance has been decided recently.

PATHOLOGY

Little has been advanced as regards the organic pathology. Two workers have recently found that the histological structure of the fibrous nodules in atrophic arthritis and in endocarditis lenta (subacute bacterial) is apparently the same.

ETIOLOGY

Modern investigation has established the fact that the causes of the rheumatic condition are multiple and their manifestations various. The various theories are as follows:

1. That it is an *allergic* state. The antigens may be: (a) bacterial toxins; (b) the products of bacterial action; (c) incompletely metabolized proteins.

Sensitization to these antigens may be progressive or capable of periodic rerudescence. There is a constriction of blood vessels, due to this sensitized state, which leads to devitalization, damage, and finally destruction of tissues which normally have a poor blood supply, (fibrous, ligamentous and articular structures). Such vaso-constriction has been clearly shown to be an integral part of the rheumatic state, probably caused by exhaustion of the endocrine-sympathetic system invariably associated with allergy.

In addition to this, in some forms of rheumatic disease, substances toxic to the fibrous, ligamentous, and articular tissues may accumulate in them and produce inflammatory changes, resulting in the proliferative type of disease (rheumatoid arthritis).

When destruction results from lack of nutrition, the hypertrophic form of the disease results (osteo-arthritis).

2. *The Infection Theory*.—The infection may be due to various germs: (1) *Streptococcus cardio-arthritidis* of Small,³² (2) specific organisms, such as the tubercle bacillus, pneumococcus, etc.; (3) non-specific—most workers believe in the bacterial etiology of many cases of arthritis, but find it increasingly difficult to agree upon any one single organism as the sole or even the chief offender; (4) Zinsser and Swift³³ think that the supposedly specific rôle of any organism in rheumatic fever is of less importance than a general allergic background, on the basis of which a variety of organisms may, through some common property, produce comparable results.

3. *The Chemical Theory*.—Wells³³ states that the actual influence of bacteria in their immunological relations must be sought for in the chemical factors concerned.

4. *The Physiological Theory*.—Whatever the actual etiological factor, the disease itself is caused by a disturbance of the normal functions of the tissues concerned. Pemberton and others²⁷ have found a slight lowering of the basal metabolic rate in arthritics. They attribute this to interference of the blood flow to certain structures, probably, chiefly, the muscles.

A lowered sugar tolerance, or delayed sugar removal, is present potentially in 76 per cent of cases (Cajori, Crouter and Pemberton³⁴). This is attributed to the possibility of the tissues in the arthritic being slightly anaemic, due to a closure of the finer vessels in the capillary beds. The latter condition has been studied by direct observation of the capillaries at the root of the finger nails, and also by contrasting the red blood corpuscles in the first and fourth drop of blood from finger tip. The first drop of blood from arthritics showed a definitely lower count than in the normal. In a study of the effect of systemic heat, exercise and massage, it was felt that the benefit derived was due to the improved blood flow which they bring about.

5. *Endocrine and Metabolic Theory*.—Certain types resemble patients suffering from thyroid disorder and improve with proper treatment. Certain types show achlorhydria (Kilgore¹⁹).

6. *Predisposing Factors*.—The chief that should be mentioned are: climate, sedentary habits, mental and physical strain (Emerson¹¹), an atonic large bowel (Graham and Fletcher¹⁵).

TREATMENT

This must necessarily follow a complete investigation in all cases, and must proceed along systematic lines. Haste has no place in the treatment of arthritis. All definite foci of infection should be removed. It would appear that we often have an indefinite idea of the systemic nature of the pathological deviation in our unwelcome arthritic cases, and after elimination of diseased tonsils and carious teeth, we are too glad to receive the promise of success carefully worded by some commercial firm. We are thus easily led to overlook measures of real value, such as rest, physiotherapy, diet, colonic irrigation, and tonic medication.

Drugs should be used but not abused, particularly in attempting the relief of pain. Members of the phenazone (antipyrin) group and salicylates are the most valuable. Iodides probably owe their reputation to their effect in cases associated with endocrine disturbance. They are not so useful as thyroid extract. Stock vaccines and other protein injections act by producing shock and are useful in certain cases. The autogenous vaccines are not of any special value.

Physical Therapy.—This is coming prominently into the foreground through the activities of the Council on Physical Therapy of the American Medical Association.

Massage.—Its influence is chiefly upon the circulatory system, although it probably exerts a local effect on metabolism, which by repetition may become cumulative and express itself systematically (Cajori, Pemberton *et al.*⁴). It should be begun very gradually. It increases the red cell count of the blood, and increases the blood flow to the part. The net result is the removal of products unfavourable to local function. Massage is particularly effective when it follows the external application of heat to the affected parts. A physician should control the application. Joints should not be included in general massage. Much damage is done by manipulating joints when inflamed. The smaller joints, particularly, do not respond to this measure.

Rest.—The importance of rest is not always adequately appreciated. Bock attributes the benefit derived to the fact that the recumbent posture is accompanied by increased cardiac output, and hence possibly increased blood flow to the relatively anaemic areas involved in the arthritic process. One realizes that other influences are also at work. Periods of rest, one and one-half hours long, should be insisted on morning and afternoon in most cases of arthritis, in conjunction with the other treatments indicated.

The Intestinal Tract.—The relation of the

intestinal tract to arthritis is being increasingly appreciated. The laity are flocking in great numbers to establishments which "specialize" in colonic irrigation. This of course is being overdone. But several writers are quite convinced of the value of flushing out the colon, especially when x-ray findings reveal a potted colon with sluggish action, and few hastræ. Cruickshank¹⁰ believes that under normal conditions the intestinal mucosa presents a sufficient barrier to the passage of bacteria beyond the bowel. A circulatory disturbance, however, may cause the mucosa to become abnormal and therefore no longer an efficient barricade against invading organisms.

Diet.—It is interesting to note that the lesions frequently seen in the cæcum and colon of arthritics, chiefly dilatation and elongation, are comparable to changes found in experimental animals suffering from a deficiency of vitamin B. Furthermore, arthritic patients seem to do badly when excessive carbohydrate is given, and it appears that carbohydrate is actually essential for the development of the deficiency syndrome above described in animals lacking vitamin B. Graham and Fletcher¹¹ recently reported arthritic cases with atonic colons which were definitely benefited by low carbohydrate and high vitamin B. (yeast or wheat germ) diet. X-ray pictures after this treatment showed improvement in the tone of the large bowel.

A majority of the chronic arthritics show a diminished glucose tolerance blood curve. The delayed sugar removal is an expression of the denial of adequate amounts of blood to the tissues concerned, probably, chiefly, the muscles. This conception fits in with the localized anaemic theory, already expressed, as occurring about arthritic joints.

Drugs, etc.—Arsenic is still the most useful. *Ortho-iodoxyl-benzoic acid* has had some publicity. It is essentially a salicylate. Given intravenously or by the rectum it has a more sustained effect than has salicylic acid. Hoebler and Weitzenfeld¹² have used *sulphur* in the form of a colloid suspension of sulphur in gelatin, called "sufrogel." The benefit is supposed to be due to the affinity between sulphur and the cartilaginous ground substances. This is purely speculative.

A soluble extract of Small's *streptococcus cardio-arthritidis* is on the market. It is supposed to desensitize the patients as regards the allergic condition in arthritis, but its true value has yet to be determined. *Radium emanation* has been recommended by Freund,¹³ but this work requires a critical study. *Mud baths* have been tried. Rubinstein¹⁴ regards the benefit derived as due to a changed tone of the vegetative nervous system, and a resulting sedative effect on the myeloid tissue of the bone marrow.

It is becoming more and more felt that certain physiological disturbances are necessary as a background before bacteriological or other agencies can induce the disease. Dr. A. H. Gordon, in the Montreal General Hospital, has emphasized this point for some years past. As regards this view, it is interesting to note the strong evidence which points to a disturbance in the blood supply of the more finely vascularized regions, as at least an important factor in the production of local tissue changes. All this evidence agrees well with the nature of the influence of most measures which benefit the arthritic syndrome, such as heat, massage, exercise, etc. Emerson has recently reported a series of cases of chronic arthritis the onset of which seemed to definitely date from the receipt of a mental trauma or shock. These cases were benefited by treatment along psychotherapeutic lines.

In line with the viewpoint of disturbed physiological action, Rowntree and Adson³⁰ report a case of a young woman completely crippled with atrophic arthritis, who was entirely relieved of her symptoms, in the lower limbs, after removal of the 2nd, 3rd and 4th lumbar sympathetic ganglia; a year later the upper extremities were relieved in a like manner.

In conclusion, one can say that whatever the actual predisposing cause is in any given case of arthritis, whether infective, metabolic, traumatic or allergic, our understanding of the whole problem has been placed upon a more advanced plane.

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AN OLD VIEW OF MEDICAL EDUCATION.—“Men can never become physicians from books, but Galen and Hippocrates must be read as fathers and fountains of the faculty. Lay your foundation in anatomy; read also Vesalius, Spigelius, and Bartholinus; be sure to make yourself master of Dr. Harvey’s piece De Circul. Sang., which discovery is preferable to that of Columbus; study plants, animals, the *materia medica* mentorum; be not a stranger to the useful parts of

chemistry, and so by degrees march on. Having learned anatomy, read over two or three times Senertus’s Institutiones, after which you will seldom meet with any point in physic on which you will not be able to speak as a man. In reading satisfy yourself not so much with the remedies set down as with the true understanding of the nature of the disease.”—Sir Thomas Browne, *Letters*.

Editorial

I. P. PAVLOV

THE name of I. P. Pavlov is known not only to every scientist but to most educated people. Undoubtedly, he is the greatest physiologist of our time. How much he is esteemed is shown by the fact that on every public appearance during the XIIIth International Physiological Congress he received a great ovation. On September 26th we joined in celebrating his 80th birthday. In spite of his years he is still extraordinarily active in research. At this time it is specially fitting to remember what he has done for physiology in particular and for science in general.

Three fields in physiology, chiefly, engaged Pavlov's attention. In the early days of his career he was interested in the problems of the circulation (regulation of the blood pressure; innervation of the heart.) Later, he devoted himself to the study of the secretion of the digestive glands, and during the last twenty-seven years his whole attention has been devoted to the function of the central nervous system, studied by the method of conditioned reflexes.

Notwithstanding the different territories of physiology in which Pavlov has worked, one and the same idea has guided him throughout all his investigations. The line which he has pursued in his investigations, and to which he gave such great experimental support, may be called "synthetic physiology." (It is said that Professor I. de Burgh Daly of Birmingham proposes to name this tendency in physiology "integral physiology"). If "analytical physiology" has as its aim to decompose a phenomenon into its components and to give them a physical or chemical or a physico-chemical explanation, "synthetic physiology", using similar methods, takes into consideration the whole body, and relates its findings to the organism as a whole. Thus, though there is little difference in the methods of investigation in both cases, the tendency of the investigation, its ultimate aim, is not the same. It was Claude Bernard who

particularly emphasized this integrating tendency. Nobody, however, has contributed so much to its development and experimental foundation as Pavlov. In this respect his work is of quite exceptional importance. It would not be an exaggeration to say that in many physiological laboratories to-day experimentation on animals is replaced by the application of physico-chemical and physical methods of investigation to the analysis of the more basal functions of living cells, tissues, and organs. Important as this is in our science, it should be recognized that the analytical method in itself gives only an incomplete picture of life processes. The latter are usually the resultant of complex interplays of phenomena, and it must not be overlooked that only after the integration of analytical results can the isolated facts give a satisfying conception. A day will come when the most elaborate physical and chemical explanations of separate physiological phenomena will no longer satisfy the investigator. No function of the body is independent of others, and every function is continually changing with the changing conditions of the body. There is also danger of too much of the analytical viewpoint in pathology as well as in physiology. In reality, it is difficult, and perhaps impossible, to draw a line of distinction between these two subjects. As a consequence of this too narrow viewpoint, the art of experimentation, which entails a special, fine technique in vivisection, combined with a highly developed power of exact observation, is disappearing with threatening rapidity from the physiological laboratories. Synthetic physiology alone will help us to understand the correlations of the functions of different organs and will make it possible to build up a conception of the organism as a whole. Besides this, it will form the basis of a true physiological medicine, since medicine has always to deal with the body as a unit.

According to Pavlov, an animal body is

an extremely unstable system, which must constantly maintain its equilibrium with the outer world. To every change in the outer world, whether the most insignificant or one which threatens to destroy the organism, it answers with definite reactions, *i.e.*, with a change, or consecutive changes, in its activities. A constant neutralization of the effects of changes occurring in the outer world, as well as in the inner world of the body itself, is thus accomplished. Therefore, in referring to the physiological, *i.e.*, the normal, function of an organ, we must, strictly speaking, take into consideration the functional state of all the other systems and organs of the body. Incidentally, this conception of a living organism made Pavlov very critical regarding the so-called method of "acute experiment." He always, of course, recognized its great importance for physiology, but he never tired of repeating that the condition of an animal or an organ during such experiments is often far removed from the normal. This incited him, in the case of the digestive glands, to work out a special method for establishing "permanent fistulae" of the gastro-intestinal tract. He organized a special aseptic department in his laboratory for this purpose, and called the method: "the method of physiological surgery." At the present time an aseptic department such as this is a necessary adjunct to every experimental physiological and pathological laboratory.

In a short biographic sketch it is quite impossible to give a review of the scientific achievements of Pavlov and his school. It is enough to say that his studies on the inner-

vation of the heart are of fundamental importance in this branch of physiology. His investigations concerning the activity of the digestive glands, at the end of last century, afforded for the first time in the history of our science a clear and precise picture of the workings of the alimentary tract. As a result of the new operative methods employed in this investigation, and the new ideas on which it was based, this classic work has fertilized research in this branch of physiology all over the world for more than thirty years. Furthermore, Pavlov's data on the function of the digestive glands formed a basis for clinical investigations of the diseases of the alimentary canal.

How far the study of the function of the central nervous system by the method of conditioned reflexes will influence the different domains of knowledge and human relationship cannot yet be fully realized. This is the true physiology of the hemispheres. Descartes' conception of a "reflex" was enlarged and deepened by Pavlov. It was applied to the highest parts of the central nervous system which regulate the finest relations of the animal with the outer world. There is very little doubt that more than one generation of investigators will be occupied in applying, perfecting, and extending the method of conditioned reflexes as a means of studying the function of the central nervous system. Moreover, psychiatry, psychology, sociology, and paedagogy will recognize the new ideas, and in many instances will become adapted to them.

B. P. BABKIN.

DIABETIC COMA AND DIABETIC MORTALITY RATES

IN a recent circular letter¹ issued to physicians by the Department of Health, Massachusetts, attention is called to diabetic coma as a cause of death, and its influence upon the mortality rate from diabetes mellitus. Coma, "always preventable, and nearly always curable," a condition which develops because of "ignorance, negligence or carelessness" on the part of the patient is, in

spite of the advent of insulin, largely responsible for death amongst diabetics. Statistics of the Metropolitan Life Insurance Company are quoted to show that of 1,044 fatal cases of diabetes reported to that company this year to April 15th, coma was responsible for 433 deaths, an incidence of 41 per cent. Failure to lower the death rate from coma is, it is stated, largely responsible for failure to lower the mortality rate from diabetes, and for this the medical profession is to blame. "It is really our own fault....."

1. Prevention of Diabetic Death, Department of Public Health, Commonwealth of Massachusetts, June 12, 1929.

says Dr. Joslin, the author of the circular mentioned.

That Dr. Joslin is not alone in this opinion may be seen from a paper by Dr. Gladys Boyd² in this issue of the *Journal*. Since insulin came into use, fifty-one cases of diabetic coma have been treated at the Hospital for Sick Children at Toronto. In the majority of cases, the nature of the illness was not even recognized when coma developed; the patients were sent to the hospital for uræmia, laryngeal obstruction, or acute abdominal conditions, or no diagnoses had been made. The proportion of the hospital-treated children who died, as recorded by Dr. Boyd, is, to say the least, disturbing; ". . . . The steady fall in the death rate which started in 1923 at 60 per cent and reached its minimum in 1927 at 12 per cent has been succeeded by a rise to 25 per cent in 1928 and, by another higher still so far this year." In Dr. Boyd's experience 80 per cent of the fatalities were due to coma, and late admissions to the hospital, it is important to note, were largely responsible for the deaths. In a table given in her paper are demonstrated the effects of delay in treatment, and, equally important, and supporting Dr. Joslin's thesis, is the demonstration that one-third of the cases were in coma for at least forty-eight hours before admission to the hospital; in some instances as much as four days; and in nine cases more than four days.

In another paper, also appearing in this number of the *Journal*³, Rabinowitch records the latest available death rates from diabetes amongst large populations (large cities, states, countries, etc.). From this report it would appear that the death rate from diabetes is stationary, differing little from that met with prior to the discovery of insulin.

In each of the above mentioned communications, exception could be taken to the statistical conclusions drawn from the data presented. For example, in a table given by Rabinowitch, the mortality rates are expressed in full terms of deaths per 100,000 population. It is obvious that,

before full significance of the data recorded as a measure of the efficacy of the management of diabetes can be appreciated, it is necessary to know not only the total number of deaths amongst diabetic persons but also the total number of individuals exposed to the risk of that form of death, in other words, the total number of diabetics in the given populations. The latter information is, obviously, unattainable amongst such populations. These rates given are, however, fairly reliable for one purpose, namely, to compare death rates at different times in the same locality, providing that the periods compared are not too far apart and there have been no marked fluctuations in the age and sex proportions, as is apt to occur by reason of immigration and emigration. Assuming the reliability of the rates given for this purpose, they lead to a rather important observation. Most authorities are of the opinion that diabetes is on the increase. Therefore, if the disease is on the increase and the populations and mortality rates are stationary, the logical conclusion is that the death rate from diabetes is on the decrease.

Exception may also be taken to the above mentioned circular issued by the Department of Health of the State of Massachusetts, because of the use of the data reported by the Metropolitan Life Insurance Company. The data merely show that of a given number of diabetics who died a certain number had coma at the time of death. Since no life insurance company knows how many of its policy-holders have diabetes, a statement that a certain number died in coma is an isolated statement of fact quite devoid of significance, since here, again, there is no information with regard to the number of deaths from diabetes and the number exposed to the risk of such death. In addition, it should be mentioned that the data of the insurance company mentioned are largely from "industrial" policyholders, a social class scarcely in a position to command other than meagre medical attention, and amongst whom the doctor is not apt to be called until the patient is obviously very ill.

Interpretation of the data is further complicated because of the period during which they were obtained. Investigation of the original records of the Metropolitan Life

2. BOYD, GLADYS L., *Canad. M. Ass. J.* 21: 520, Nov. 1929.

3. RABINOWITCH, I. M., *Canad. M. Ass. J.* 21: 524, Nov. 1929.

Insurance Company⁴ showed that the deaths mentioned occurred during the time of the year when influenza and pneumonia were widely prevalent. As a matter of fact, the records showed that amongst these diabetics there were 99 cases of influenza and 132 cases of pneumonia, and the liability of such infections to precipitate coma in even comparatively mild diabetics (unless under careful supervision, which certainly does not obtain amongst "industrial" policyholders) is well known. In support of Dr. Joslin's thesis, however, it must be observed that, during the months of March and April, when the influenza epidemic was rapidly waning, the diabetes death rate exceeded the highest figures recorded for the same months in 1928.

Exception could also be taken to the statistical conclusions drawn by Dr. Boyd from the recorded data. With a knowledge of the number of children treated for diabetes at the Hospital for Sick Children and also the number of deaths, there was an opportunity afforded to relate the number of deaths from diabetes to the number of individuals exposed to the risk of such deaths. If the ages of the individuals at the time of death were known, that is, with death rates adjusted for age, the best possible measure of mortality would be available. Adjustment of death rates according to age, though necessary for all ages, is doubly essential in the case of children, since the expected deaths at the different age intervals between one and ten years differ very markedly. Thus, per 100,000 children between one and two years of age the "expected" number of deaths is 2,762, whereas, between the ages of nine and ten it is 247 (Glover's Table).*

4. Metropolitan Life Insurance Company, Statistical Bulletin, vol. 10, No. 5, May 1929.

* For the reader not familiar with Life Tables an explanation of the term "expected" deaths may here be desirable. Let us imagine that 100,000 people were born at the same instant of time and are to be under constant observation until all have died. The following will take place:—

A certain number will die during the first year of life, and during each following year there will be a number of deaths until, at last, all have died. For large populations, the average number which die at the different age intervals has been calculated. Thus, (Glover's Tables) 11,462 will die before they reach their first birthday. The death rate between the first and second birthdays will be 2,764 per 100,000 of those living at the beginning of that age interval; at the age interval between the second and third years, the death

Unfortunately, Dr. Boyd does not give the ages of the children at the time of death. An additional and undiscounted factor is the smallness of her groups and the disturbances which result in all small groups from chance. Though the number of diabetic children in any one clinic must, because of the incidence of juvenile diabetes, of necessity be small, the fact remains that, because of the small number limited significance only can be given to figures resulting from such.

A further observation may be made with regard to the high mortality rates reported from the Hospital for Sick Children. It is suggested here that this is probably an isolated experience rather than the general rule. For this observation there are two reasons. Firstly, judging from the literature, most authorities believe that the treatment of diabetes amongst children, as compared with adults, is highly satisfactory. A more important observation, however, is the fact that recorded experiences with large populations do not agree with those of Dr. Boyd. In the above mentioned circular, Dr. Joslin recorded mortalities according to age and, at least in the State of Massachusetts, diabetes under age 20 has almost disappeared as a cause of death. Between the ages of 20 and 49 the mortality rate is lower than at any time in this century, whereas, above the age of 50 there has been a gradual rise.

The purpose of dilating upon the statistical nature of the papers referred to is to demonstrate that from the evidence (statistical) presented the quantitative effects of coma on the death rate from diabetes cannot be estimated. From the statistical evidence, therefore, the case against the physician is "not proven." The incontestable fact, however, remains, that coma, a condition which is nearly always preventable and nearly always curable, still accounts for a large number of deaths. Since diabetics who die of diabetic coma nearly always die of a

rate will be 1,234 per 100,000 living, etc. These figures, therefore, represent the *expected* death rates and are of great value since they may be made use of in order to determine the efficacy of any form of treatment for any disease. For example, of 100,000 at age forty, 939 are expected to die before they have reached their forty-first birthday. If of 100,000 diabetics at age forty, 1,878 died before they reached their forty-first birthday, twice as many have died as was to be expected.

preventable and curable condition, the true death rate from diabetes, whatever it may be, could be lowered by the prevention, early recognition, and proper treatment of this complication. This should be generally recognized. There are now available in the literature numerous publications with

details as to the management of this condition with which every physician should be thoroughly familiar. In Dr. Boyd's paper details are given with regard to juvenile diabetes. These apply equally, with very slight modifications, to the adult.

I. M. RABINOWITCH

MALARIAL THERAPY IN GENERAL PARALYSIS

A N interesting report* on general paralysis and the results obtained from its treatment by an induced attack of malaria has just been published as a monograph by the British Board of Control. It opens with a brief historical account of our knowledge of the disease, written by Sir Hubert Bond. In it he gives the credit of publishing, in 1798, the first recognizable description of a case of this disease appearing in the medical literature of the past to Dr. John Haslam, then resident Medical Officer of Bethlem Royal Hospital. In this first description of a case the delusions of grandeur, followed in a short time by symptoms of paralysis and dementia, are unmistakable, and the pathological findings are definite. About this period other cases of paralysis with some enfeeblement of the mind were reported both in England and in France, but the symptoms in each case are described so vaguely and with such lack of detail that no diagnosis is possible. The first recognition of the disease as a distinct clinical entity must be attributed to A. L. J. Bayle, a young student in pathology, aged 23 years, who in his thesis entitled "Recherches sur les maladies mentales," presented to the Faculty of Paris for the doctorate of medicine, recorded his opinion that general and more or less complete paralysis associated with mental disorder, when they develop side by side, were due to a chronic arachnitis, and were the associated symptoms of a distinct disease having a definite morbid anatomical picture. This was an opinion never expressed before by anyone, and has since been shown to be true. To him, therefore, was given the credit of the discovery of this severe and important nervous

affection, the centenary of which in 1922 was definitely honoured. During the two closing decades of last century, the connection of this disease with syphilis began to be regarded as almost certain, and was finally confirmed by Sir Frederick Mott in his monumental volume published in 1910 on "Syphilis of the Nervous System," and three years later by the discovery of living spirochaetes in the brain by Noguchi and Moore.

The gravity of this affection was recognized from the first, and a diagnosis of its presence in a patient was always regarded as equivalent to a sentence of death within three or four years, as no therapy known until recent years offered any prospect of remission, much less of cure. Since the introduction, however, of its treatment by the induction of an attack of malaria a great improvement in the prognosis has taken place. The discovery of the value of this treatment was not fortuitous. Gerstmann¹ has given us the story of the long series of attempts by Wagner-Jauregg of Vienna to find a non-specific method of treatment, as all forms of specific medication had failed to effect any permanent beneficial results. The first attempt was undertaken in 1888-1889, and consisted in an effort to transmit erysipelas to patients suffering from this disease, but this proved quite useless. In 1890, Wagner-Jauregg began to experiment with bacterial substances using at first Koch's tuberculin, and afterwards the polyvalent typhoid vaccine of Besredka; following these, he tried polyvalent staphylococcus vaccine, and finally the injection of sodium nucleinate; but although some benefit was obtained in some cases, in none were the results satisfactory. Not until the

* General Paralysis and its Treatment by Induced Malaria. Report by Surgeon-Rear-Admiral E. T. Meagher, R.N. H. M. Stationery Office, 1929.

1. Die Malariaabhandlung der progressiven Paralyse, by Dr. Joseph Gerstmann, Julius Springer, Vienna, 1925.

summer of 1917 was inoculation with the tertian malaria parasite tested. Of the nine patients on whom the test was made one died in a paretic attack before the treatment had been completed. Of the remaining eight, four achieved a complete remission and were discharged as able to work after six months from the beginning of the treatment. Three of these continue to hold responsible positions. Two cases showed slight improvement; one became melancholic and committed suicide; in the eighth the remission was long delayed, and did not appear for more than a year, but since then has thus far proved to be permanent. Another batch of experiments were made in the winter of 1918, but were a complete failure owing to the fact that the estivo-autumnal strain of parasite was employed instead of the tertian. In September, 1919, the clinic received a pure strain of the tertian parasite, and since then cases have been inoculated without interruption.

In the summer of 1922 this method of treatment was introduced into England by Dr. R. M. Clark, of Whittingham Asylum, with results so satisfactory that the value of the method became generally recognized and adopted in many of the English institutions. Early in 1924 the Board of Control in England issued a circular letter to all institutions under their care directing them to investigate the new remedy. To ensure good results, infected blood was supplied by the Whittingham Asylum to other hospitals, and a special mosquito centre was started at Horton.

To secure the figures for comparison in this monograph a review was made of the fate of 624 general paralytics, who were patients in the asylums in England in 1923, before malarial treatment had become generally employed. Of these patients 560, or 90 per cent, were dead at the end of 1927; 52, or 8 per cent, were still in the hospitals; and 12, or 2 per cent, were living at home. All but two of those still in the hospital were in the last stages of the disease. The 12 living at home were all found to be mentally abnormal; not one was capable of undertaking any ordinary occupation. A similar investigation of the cases admitted into

other hospitals during 1924 showed similar results.

In contrast with the above figures, 286 patients were treated by the induction of a tertian malarial attack in 1924, and an investigation at the end of 1927 showed that of these 286, 120 were dead, 94 were still in the hospital, and 72 had been discharged. Thus 166, or 58 per cent, of the patients were still living. Of the 94 cases still in the hospitals all showed physical improvement, and 34 showed marked mental improvement. Of the 72 discharged, definite information was obtained regarding 67; 39 of these were at work as wage earners, 5 others were temporarily unemployed, 10 were engaged in their ordinary household duties, and 4 others were prevented from working by disability unconnected with the paralysis. Four were undertaking part time work. Similar reports are given of cases treated in 1925, 1926, and 1927, but the time which has elapsed is too brief to make complete reports. Summing up the reports of five years' malarial treatment, the total number of patients treated was 1,597. Of these 34 per cent were dead; 40.8 per cent were still in the hospital, but improved; the remaining 25.2 per cent had been discharged and for the most part were well.

Thus it would appear that malarial treatment definitely increases the length of life, renders existence more natural, and produces improvement in both mental condition and physical state. In many instances complete recovery seems to have been achieved. The opinion is generally held that more might have been accomplished if the cases had been seen earlier. As it is, the treatment certainly offers a great advance in view of the previous hopelessness of the disease.

In Canada the method has been used with much success in many of our hospitals. We publish in this issue a report from the Verdun Protestant Hospital, in which, under careful investigation and supervision of each case, excellent results have been obtained. Special attention is there directed to the value of tryparsamide as an additional remedy following the primary use of the malarial organism.

A. D. B.

THE PRESENT STATUS OF UNDULANT FEVER

IT is becoming more and more evident, as time goes on, that undulant fever is quite widespread, not only in Europe but also in America. In 1907, when Bruce discovered his specific micro-organism, *micrococcus melitensis*, it was thought that cases of undulant fever, or, as it was usually called then, Malta fever, were confined to Malta, the littoral of the Mediterranean Sea, and certain parts of Asia, including the Philippines. Now they are to be found in Canada, Denmark, England, France, Germany, Holland, Italy, Poland, Spain, Sweden, Switzerland, and the United States. The increased recognition of the disease is due to some extent, no doubt, to more accurate methods of diagnosis, and to the fact that public health authorities and veterinarians are now more generally on the alert about it, but competent authorities are of the opinion that this does not explain the great number of cases now being reported, and hold that the disease is actually on the increase. So far as the United States is concerned, Blumer¹ thinks that undulant fever has spread considerably during the last two or three years, and Hardy² states that during 1928 and the first five months of 1929 more than one thousand cases were diagnosed and these were scattered over forty-two states. The disease also has appeared in Canada and reports of cases have appeared in the *Public Health Journal*³ and in our own *Journal*⁴.

It has been known for some years that Bruce's organism is related to the *B. abortus* of Bang, which is the cause of contagious abortion in cattle. In 1918, Alive Evans⁵ showed that these two organisms are morphologically, culturally, and biochemically indistinguishable, and, moreover, are very closely related serologically. Not long after,

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1. BLUMER, G., *Ann. Int. Med.* **3**: 405, Aug. 1929.
2. HARDY, A. V., *J. Am. M. Ass.* **93**: 891, Sept. 21, 1929.
3. HARRIS, MCCOY, STEVENS, AND LYMAN, *Pub. Health J.* **19**: 272, June 1928. MACLEAN, D. L., Mc-KINNON, N. E., YOUNG, G. S., JEFFREY, A. M., *ibid.* **19**: 274, June 1928. WARNER, W. P., *ibid.* **19**: 314, June 1928.
4. HANNAH, J. A., *Canad. M. Ass. J.* **20**: 396, April 1929.
5. EVANS, A., *J. Infect. Dis.* **22**: 589, June 1918.
6. MEYER, K. F., AND SHAW, E. B., *J. Infect. Dis.* **27**: 173, Sept. 1920.
7. BEVAN, L. E., *Trans. Roy. Soc. Trop. Med. & Hyg.* **15**: 215, 1922.
8. KRISTENSEN, M., AND HOLM, P., *Centralbl. f. Bakter.* **112**: 281, May 28, 1929.
9. HUDDLESON, I. F., *Tr. Am. Pub. Health Ass.*, p. 18.
10. SMITH, T., *J. Exper. Med.* **49**: 671, April 1929.

Meyer and Shaw⁶ suggested that a new genus be created, to be known as *Brucella*, in honour of its discoverer. Accordingly, *Micrococcus melitensis* became *Brucella melitensis*, variety *melitensis*, and *Bacillus abortus* became *Brucella abortus*, variety *abortus*. Then, as it became evident that the *abortus* variety could be found in hogs as well as cattle, the latter form was again subdivided into bovine and porcine strains.

That undulant fever in man is closely related to the contagious abortion of cattle was first advanced by Bevan⁷, of Rhodesia, in 1922, and four years later he was able to report on thirty-five cases in support of his view. Since that date evidence enough has accumulated to convert conviction into certainty. The clinical manifestations of the infections, as they appear in man, are close, practically identical. Even abortion, which is such an outstanding feature in cattle, can occur in the human subject, and, further, may be produced by both forms of infection. Evans, some years ago, proved that *M. melitensis* is competent to produce abortion in cattle as well as Malta fever in man, and, conversely, Kristensen and Holm,⁸ in May of this year, record the cases of three pregnant women suffering from *abortus* fever, who aborted, and in one of these *Br. abortus* was recovered from the placenta.

That undulant fever and *abortus* fever are identical is perhaps still a debatable proposition. We must await more light. Yet, facts like those just mentioned, and others that can be adduced, afford strong support to the argument for the identity of the two afflictions. Man, goats, cattle, hogs, and, occasionally, sheep and horses, are readily attacked by organisms of the *Brucella* genus, and cattle and hogs, at least, can be reciprocally infected by each other's strains^{9, 10}. The differentiation of the various strains

found in the different species of animals by laboratory methods is not always successful. The melitensis and abortus varieties of *Br. melitensis* can usually be separated by agglutination and absorption tests, but it is not possible to differentiate the bovine and porcine types in this way. Here, an important, though, it must be emphasized, an inconstant, feature is that for growth the bovine strain requires an atmosphere with increased carbon dioxide tension, while the melitensis and porcine strains are able to grow in an unmodified atmosphere, and, indeed, are somewhat inhibited by carbon dioxide. Possibly, such minor differences are to be interpreted as due to modifications acquired by passage through different species of animals, and, on this assumption, the strains of *Brucella* so far known may very well be scions of one ancestral stock.

The situation in regard to undulant fever is serious, if not alarming. Not only is the disease spreading among human beings, but there is evidence that the same is true of the domestic animals. According to Kern,¹¹ of Philadelphia, in so far as the United States is concerned, 98 per cent of the herds are infected in some regions, and practically no district is free. Unless something more is done, we may expect a greatly increased prevalence of the disease.

It is known that man is frequently infected through drinking raw milk, but there is also much evidence to show that contagion plays an important part. In some agricultural districts males are three times as often infected as are females, and those persons who have the care of cattle or hogs in the fields or barn are particularly liable to contract the disease. In fact, abortus fever bids fair to join the ranks of the industrial diseases. Why this should be so will readily be understood when it is pointed out that the specific micro-organism has been isolated from the vaginal discharges of infected cattle, and that, recently, Amoss and Poston¹² have isolated *Br. abortus* from the stools.

So far as man is concerned it is, perhaps, too early to state positively how serious undulant fever may be. It is true that a

fatal issue is uncommon, serious sequels are infrequent, and acute suffering is unusual, but, at least, the disease is apt to be a prolonged one, and we do not as yet know, from a dearth of post-mortem examinations, how serious an effect may be produced upon the internal organs. It is beyond question, however, that the prevalence of the disease, both in man and mammals, is productive of considerable economic loss.

With regard to diagnosis. Any prolonged, remittent, or intermittent, fever should arouse the suspicion of undulant fever. The diseases from which it must be differentiated are typhoid and paratyphoid fevers, infection with *B. Coli*, tuberculosis, malaria, subacute endocarditis, syphilis, and influenza, and, possibly, leukæmia, and pernicious anaemia. An examination of the blood will exclude the last two; a Wassermann test will usually settle the question of syphilis. In most cases the blood shows a leucopenia, with a relative lymphocytosis, which groups the disease with typhoid and paratyphoid fevers, miliary tuberculosis, and influenza. A search for the malarial protozoon will settle the question of malaria. In general, it may be said that undulant, or abortus, fever is a fever of many symptoms and few signs. A valuable clinical fact, also, is that the subjective state of the patient is better than his appearance and the elevation of his temperature would suggest. The final diagnosis can usually be made by agglutination tests, by blood cultures, and by identification of the micro-organism by laboratory methods. The examination of all blood sent to laboratories should include the agglutination test for *Br. melitensis* and *Br. abortus* as a routine. Only in this way shall we be able to get any idea of the prevalence of this troublesome infection.

In view of the steadily increasing extension of brucella infections, the menace that thereby threatens man, and the importance of the economic problem involved, medical and veterinary practitioners and public health officials should be continually on the lookout for these cases. Not a few points in connection with the epidemiology, pathogenesis, and bacteriology remain to be cleared up. Therefore, all cases that are met with should be thoroughly examined and accur-

11. KERN, R. A., *Am. J. Med. Sci.* **176**: 405, 1928.

12. AMOSS, H. L., AND POSTON, M. A., *J. Am. M. Ass.* **93**: 170, July 20, 1929.

ately reported. Particular efforts should be made, also, to secure post-mortem examinations in the fatal cases, so that the specific

lesions, if any, may be discovered, and our knowledge put upon a more adequate basis.

A. G. N.

ON ATROPINE FEVER

ALMOST every drug in our pharmacopeia has an untoward and dangerous action as well as an action which, properly employed in abnormal conditions of the system, may have a health restoring effect. These untoward actions of drugs should be carefully considered by the physician prescribing the drug, and a strict watch should be kept on their development. It is a definite drawback to the employment of the many new synthetic drugs which at present are offered to physicians with high praise of their asserted valuable therapeutic action that very little is known of the disturbing or even dangerous effects which they may exert on important organs in the body. An example of the untoward effect of one of our well known drugs, not always considered by the prescriber, is given in a short article by Dr. Paul White¹, who calls attention to the rise in temperature and definite leucocytosis which may follow the use of atropine in full doses. White thinks it probable that in

not a few instances in which atropine, or a combination of atropine with morphine, is given to the patient before the administration of an anaesthetic the febrile reaction occasionally noticed afterwards is really due to the atropine. The length of time required for the development of this reaction following the administration of atropine varies. According to Benzing,² the fever usually starts three or four hours after its oral or subcutaneous administration, has its peak in from six to eight hours, and disappears with the rash. The rash itself is regarded by White as a strong vasomotor reaction to counteract the temperature raising action of the drug. While atropine must be regarded as an unusually valuable drug, and also a comparatively safe one, every clinician should realize that in addition to its mydriatic and mouth-parching properties the employment of atropine may give occasion for unexpected irregularity on the temperature charts of patients, especially of youthful ones. A. D. B.

1. *Am. J. Dis. Child.* 37: 745, April 1929.

2. *Monatschr. f. Kinderheilk.* 24: 509, 1923.

Editorial Comments

THE PROFESSIONAL JUBILEE OF DR. MURDOCK CHISHOLM

Fifty years ago Dr. Murdock Chisholm, of Halifax, received his degree in medicine from McGill University. Fifty years is a respectable lifetime; fifty years of professional life is a record that few can boast. We believe we are correct in saying that Dr. Chisholm is the oldest medical graduate of his university in the Maritime provinces. An event of so outstanding a character could not be lightly passed by, and, accordingly, the Halifax Branch of the Nova Scotia Medical Society presented him with an illuminated address and an oil painting of himself, at a banquet held in his honour on October 16th. This tribute was well bestowed, and the *Journal* desires to join its meed of respect and esteem with that of the brethren down by the sea.

Dr. Chisholm's professional career has been

a remarkable, if varied, one. Probably, it is as a surgeon and teacher that he is best known. In both these spheres his achievement has been notable. His first appointment to the Victoria General Hospital in Halifax was as physician; later, he went over to surgery. In the old Halifax Medical College, which eventually became the Medical Faculty of Dalhousie University, he first taught therapeutics, then clinical medicine, and, finally, clinical surgery. He was particularly active, too, in the dark days when it seemed probable that medicine would cease to be taught in Halifax. Faith was weak, except the faith of Dr. Chisholm and a few choice spirits like him. Money was scarce also; but faith, with works, prevailed. Medical education in the Maritimes owes much to Dr. Chisholm, and Dalhousie University recognized this officially when about ten years ago it conferred on him the honorary degree of Doctor of Laws. Other honours have come to

him also. He has been President of the Nova Scotia Medical Society, and was President of the Canadian Medical Association at its historic meeting in 1921. Of Highland descent, Dr. Chisholm is a "bonnie fechter," and many will remember his presidential address on that occasion, when he paid his respects (or otherwise) to the preliminary science subjects of the medical curricula.

Dr. Chisholm is "a lad o' pairts," but he is also modest and must forgive us for drawing attention to some of his special talents. He can sing a gaelic song with the best of them. We beg pardon. Gaelic should be spelled with a capital "G." Unlike some, we will not say many, of our profession, and as becomes a Scotchman, he is a deep student of The Book, and not many years ago he produced a valuable work on Biblical Criticism. Now, we are informed, in view of certain impending developments of Nova Scotian polities, Dr. Chisholm is couching his lancee (not his lanceet) as a doughty champion on the anti-prohibition side, supporting his position by appropriate quotations from the Scriptures, no doubt not forgetting the first miracle and St. Paul's famous advice to Timothy. But we must desist. Those of us who have enjoyed the advantage of Dr. Chisholm's acquaintance are delighted to bear witness to his good qualities of head and heart, and his friends everywhere will join in wishing him many years still of life and happiness.

A.G.N.

DR. A. S. KENDALL, OF SYDNEY, N.S.

The city of Sydney, N.S., has recently undertaken a large and expensive program of street paving, the cost amounting to more than \$800,000. Our interest in this arises from the fact that the Mayor of Sydney to whom this extensive plan of improvement is due is Dr. A. S. Kendall. Nor is this the only instance of Dr. Kendall's interest in public affairs. During his many years of residence in the city he has always proved himself a leader in all schemes furthering the best interests of the city. He also took a prominent part in opposing what seems to have been an unfair arrangement in remitting taxation in the case of a large industrial concern.

This serving of the public interest has not prevented his carrying on an active professional career. But as a correspondent informs us he "has ever been anxious to do things for the other fellow and has failed to provide well for himself". It is pleasant to learn therefore that the Provincial Legislature has empowered the City of Sydney to provide a small pension for Dr. Kendall for the rest of his life. In granting this power to the City, however, the Government insisted that the item should be included in the

plebiscite already mentioned. There seems to be little doubt that this was one reason why this plebiscite called forth such an unusually wholehearted and enthusiastic support. It was Sydney's way of saying thanks to one who was trusted not only as their mayor but as their medical adviser.

H.E.M.

DR. WILLIAM EWART, F.R.C.P.

Dr. William Ewart, F.R.C.P., consulting physician to St. George's Hospital, died in London on August 11th, after a long period of ill health. His connection with St. George's Hospital had been a long and honourable one; assistant physician for seven years; curator of its museum; lecturer on physiology, and for some time pathologist to the hospital. For many years also he served as assistant physician and pathologist to the Brompton Hospital for Consumption and Diseases of the Chest. In 1882 he delivered the Goulstonian lectures on Pulmonary Cavitation. He contributed the articles on Bronchitis and Bronchiectasis to Allbutt and Rolleston's "System of Medicine," and was the author of numerous communications to the medical press on the climatology of various centres at home and abroad, and of several small brochures which at the time of publication were highly thought of by students generally. Among the more important there were How to Feel the Pulse; Head Studies, chiefly Clinical; and Pulmonary Cavitation. He held the appointment of examiner at the Royal College of Physicians for two separate periods of three years; and later on served as a member of the Council from 1901-1903. His name and his writings will be pleasantly remembered by many of the profession in Canada.

A.D.B.

HEDYOTIS AURICULARIA: A NEW REMEDY FOR COLITIS

An interesting paper on the medicinal properties of a plant not recognized in the Pharmacopoeia, *Hedyotis auricularia*, n.o. Rubiaceae, a native of Southern India, which for many years has had a local reputation among the people for the treatment of various forms of diarrhoea, has been forwarded to us by Captain P. R. Bhandarkar, L.M. & S., Madras. The green leaves and roots have been used as a decoction by the Captain in cases of colitis with excellent results.

Samples of the plant have been sent to Professor B. B. Dey, of Presidency College, for careful investigation of its active principles, and to several hospitals to test its value clinically. So far, Professor Dey has succeeded in isolating an alkaloid and a possible glucoside. We hope to publish a complete report of the results obtained in the not too distant future.

A.D.B.

Special Articles

ON RAYNAUD'S DISEASE

BY A. D. BLACKADER, M.A., M.D., LL.D.,
Montreal

The syndrome to which Maurice Raynaud drew the attention of the profession in 1862 has ever since had a special interest, partly because its exact etiology and pathology remained obscure, and partly because of its being seldom met with. That fingers and toes under the influence of cold may become unduly pale and the tips assume a more or less cyanotic hue is not an uncommon observation. The paroxysmal vascular affection described by Raynaud is, however, a much more serious disorder, and is apparently due to a constricting spasm of the vessels supplying the part, generally one or more digits, producing a definite stoppage of the circulation, and giving rise to what Raynaud termed "local syncope" manifested by extreme pallor; this stage is followed by a period of "local asphyxia" during which the part assumes a more or less deep cyanotic hue which may persist for hours, until relaxation of the spasm takes place and hyperaemia sets in, changing gradually the colour of the part to a pink or brighter red, and restoring to it a normal temperature which during the cyanosis had not risen above the temperature of the surrounding air. This interference with the circulation leads temporarily to more or less abeyance of function in the part, and if prolonged or recurring may lead to loss of vitality with necrosis. Notwithstanding this severe disturbance of the circulation no demonstrable pathological changes in the vessels of the part thus affected have been made out.

In his thesis Raynaud states that his attention was first drawn to the condition by a case of spontaneous gangrene which had come under his notice in 1861, and as the result of personal research through the literature obtainable, he had collected 25 cases in which the vascular supply of the part was affected. Still further, in his later communication of 1874 he associated with this local condition two cases of temporary amblyopia, which he attributed to a tendency to constrictive spasm in the vessels of the fundus oculi. Later observers, including such men as Barlow, Osler, and Munro, have associated this tendency to spasm in the vessels with some lesion in the vasomotor centres or in the nerves, which manifested itself in temporary disturbances of other systems in the body.

Sir Thomas Lewis,¹ writing in the August issue of *Heart*, observes that nothing of definite importance has been added to Raynaud's first description, half a century ago, of the affection, and attributes this failure to advance our knowledge to lack of any experimental investigation of the conditions under which the spasm occurs. Such an investigation he has recently undertaken, and his methods and results appear in a paper which occupies the greater part of the space in that issue. Nine patients out of his numerous clientele were selected as suitable individuals on which he could carry out his investigations as to how far cold was a factor in the spasm, and to what extent the nervous system was involved. The experiments were made in a cool room in which the temperature registered between 10 and 18 degrees. The bodies of the individuals tested were kept well covered, excepting that one arm was left bare, and lowered temperatures were obtained by immersing the fingers or hands in cold water. If the rooms were over-cooled, or the water in which the hand was placed was too cold a reaction appeared to set in, which prevented the development of the attack. Under the conditions stated a large number of spontaneous attacks were watched from their very beginning; many more were induced at the will of the investigators. The range of temperature over which attacks began or ended appeared to be inconstant and to overlap considerably. On one occasion the fingers of one hand immersed in water at 22 degrees became fully cyanotic with a room temperature of 17 degrees. Recovery took place in the mild cases when the dried hand was laid flat and kept quiet upon a table in a warm room, and relaxation of the spasm was indicated by change of colour and by the fingers becoming warm and remaining so. In more severe cases the change of colour took place gradually, and in some cases intermittently, the latter indicating only partial relaxation of the spasm with a tendency to its return. Sufficient relaxation to produce redness of the skin occurred occasionally at a low temperature, but complete relaxation sufficient to maintain the digits at a normal temperature only took place at a few degrees below normal blood temperature.

All the experiments appeared to indicate that the veins were quite exempt from spasm. Even when the digits were in a cyanosed state there appeared to be free passage from the minute

1. LEWIS, SIR THOMAS, *Heart* 15: 7, 1929.

vessels to the main veins of the arm. The radial pulse could be felt in all the patients during an attack of spasm, even when the whole hand was affected. When the vessels of the digits were apparently in complete spasm, and the circulation apparently at a standstill, the spasm could be relieved and the hand restored to a red colour by immersion in warm water for a variable period. Observations also showed that there was a definite and rather precise relation between the area cooled and the area in which the blood ceased to flow. In the case of cold limited to the fingers the area of discolouration was less than the area of cooling. Cooling the two last phalanges of the fingers led to spasm in the end phalanx only, thus indicating the involvement of the main digital vessels, and not merely the cutaneous arterioles.

While it was evident from the experiments that the spasm could be relieved by warmth locally applied, relief was only obtained when the proximal portion of the vessel in spasm was influenced by the heat. Heat applied at the distal end of the finger did not relieve the spasm if the constriction extended to the root of the digit. Relaxation of the spasm has to begin at the proximal end, and only gradually extends to the distal portion. For this reason in the severer cases complete immersion of the hand effected the most prompt restoration. To sum up, it may be said that all the observations made pointed to a spasm of the digital arteries in their length, and excluded the minute vessels and arterioles.

These observations on the influence of heat and cold in this affection are not compatible with the current view that vascular spasm is a vaso-motor phenomenon. We have no evidence to indicate that vasomotor impulses confine themselves to the tips of the digit, nor can we explain with any theory of vasomotor action that vessels in single fingers can be brought into spasm by the application of cold to them. The only conclusion possible from the results of the investigation is that the spasm is due to some hypersensitivity in the coats of the affected arteries to relatively low temperatures. It was not necessary to call in the intervention of the central nervous system in any of the investigations made.

A limited number of observations were made with a view of determining whether the superficial vessels were affected as a whole in these patients, or whether the susceptible condition was limited to the supplying arteries. The tests were not extensive, but were sufficient to make it certain that there was no gross general change in the superficial arteries of these patients.

Furthermore, Sir Thomas Lewis investigated

the effect of complete anaesthesia of the ulnar nerve on the circulation of the parts affected by the spasm. The anaesthesia of the nerve failed to produce more than slight relaxation in the flow of blood through the ulnar half of the hand. The temperature of the fingers was not appreciably raised, and cooling of the hand re-induced complete spasm, thus indicating that the vasomotor palsy of the vessels had little effect upon the spasm itself.

Periarterial sympathectomy of the vessels supplying affected parts has also been tried. Adson and Browne² describe an operation on a girl of 16 years, suffering from severe Raynaud's disease of the feet, and believing the disturbance due to an abnormal sensibility of the vasoconstrictor nerves stripped the coats of both common iliac arteries. The operation led to an improved colour in the limb with slightly increased temperature, but gave little relief to the spasm itself.

Summing up the results of his investigations Sir Thomas Lewis calls attention to the fact that the condition which he investigated was only that type of the disease in which the digits, either fingers or toes, became paroxysmally pale and cyanotic, a condition which, if recurring frequently, may result in a limited dry gangrene. Raynaud in his original thesis discussed 25 patients. Of these only 6 would appear to belong to the group in which Sir Thomas Lewis was specially interested. Ten more appear to be in a different group, the etiology of which is still uncertain. For purposes of progressive study, Sir Thomas Lewis considers it essential that Raynaud's group of cases should be subdivided. Careful observation of this smaller group indicates that the immediate cause of the defective circulation is spasm of the digital arteries; vessels of smaller calibre and vessels on the venous side are not involved in the spasm. Local applications of heat and cold show that the spasm is profoundly influenced by the temperature. The abnormal element in the syndrome would appear to be a local and direct reaction to a lowered temperature, due to a peculiar hypersensitivity of the vessel wall, and not the result of a reflex through the vasomotor nerve. The pathological element in the vascular spasm is not of central nervous origin as it has generally been thought to be, and there would appear to be no foundation for relating this vascular phenomenon with diseases of the nervous system in other portions of the body. Recent research points to the possibility of it being due to some deficiency of calcium in the blood.

2. ADSON, A. W., AND BROWN, G. E., *J. Am. M. Ass.* **84**: 1908, 1925.

THE ART OF STUDY

By A. D. BLACKADER, M.A., M.D., LL.D.,

Montreal

In an address delivered last year at the opening of Guy's Hospital Medical School, Professor R. D. Gillespie,* psychologist to the hospital, referred to study as an art in which his branch of medicine could, perhaps, offer some suggestions that might prove of interest, not only to students, but to all members of that profession whose practice demands almost continuous and lifelong study.

The mental powers involved in the act of studying a subject present several aspects which may perhaps be profitably distinguished. The more important of these are attention, memory, and association.

The Mental Process

Considering the mental process in its entirety, study may be regarded as mental work, for which a mental work curve may be made, showing at first a rise, followed later by a decline in actual accomplishment. Several factors influence the curve. Fatigue is important, but fatigue is a complex affair dependent upon many conditions. Comparatively little of the fatigue appearing in a mental task is definitely mental in origin. Much of what masquerades as mental fatigue arises from interruptions and distractions; and especially is this the case when the task is not interesting, and is of a boring character. An illustration of the comparative indefatigability of mental performance was furnished by the feat of Dr. Arai, quoted by Dr. Gillespie, who multiplied pairs of four place figures continuously for twelve hours without a break. At the end of the twelve hours of continuous multiplication she took rather more than twice as long to perform each complete four figure multiplication as she did at the beginning. Her efficiency was therefore still very high. Furthermore, a normal period of sleep completely restored her capacity, and the work was repeated on four successive days.

Fluctuations occur, however, in the performance of a mental task. Improvement may take place for several successive days, and then a failure to progress may be seen, after which improvement may be resumed. It appears probable that some subconscious re-arrangements have been occurring in the brain, which when they are completed enable further improvement to take place. Spurts in which performance is at the highest may occur at the beginning of a task when its novelty stimulates all the mental energy, and sometimes at its close, when the prospect of satisfaction over a completed task may also be accompanied by increased effort.

"Change of work is as good as a holiday" is a proverbial saying and holds true for many kinds of mental work. Subjective fatigue, which is frequently another name for boredom, may be abolished in this way, but a person readily wearied by continuous work of one kind is likely to be similarly affected by continuous work of any kind.

The following deductions are drawn from clinical experience. The mental fatigue of which complaint is frequently made is a matter of comparative unimportance, as only a small proportion of it is properly attributable to fatigue of the brain cells, and this small amount may readily be abolished by a rest pause and normal sleep. The greater part of so-called mental fatigue is made up of boredom, and the impairment of mental performance in such cases is nearly always the result not of intellectual fatigue but of anxiety or worry resulting from some personal problem. For practical purposes the mind is almost tireless. On the other hand, violent physical exercise may disable a person from concentrated mental work for some time afterwards. Even when there is considerable deprivation of sleep intellectual accomplishment may be persistently maintained at a high level, if the worker does not worry about the loss of sleep. To secure the best results mental work should be so arranged that it can be carried on without interruption for several hours at a time, if need be. Rest pauses, which need only be very brief, if well arranged may in many cases tend to increase the total mental output.

On Memory

Turning now to some of the aspects of mental work, memory may be regarded as one of the most important involved in study. There are three distinguishable stages in memory, namely, the impression of an experience on the mind, its retention there, and its recall when wanted. The impression or registration of an experience is dependent on a lively mental attitude. The clearness of our impressions depends largely upon the attention given to the objects producing them. Objects in the focus of attention are more clearly perceived than objects in the fringe, or marginal field, of attention. Although in some cases such objects in the marginal field are more distinctly and firmly impressed than at first seems credible, for ordinary purposes we must rely on focal attention. Ability to give attention persistently seems to be directly proportional to the brain power possessed by the person attending. Instability of attention is a symptom of defective mental power. Lapses of attention, however, occur, usually unnoticed, in normal persons every few seconds. If a watch be placed just within hearing, it will be found to become alternately audible and inaudible. Fatigue and

* Gillespie, R. D., *Brit. M. J.* 2: 365, Sept. 1, 1928.

alcohol increase the depth and duration of these lapses. Any toxæmia and the presence of organic brain disease have a similar effect. "Singleness of mind" is essential for efficient work of any kind, and more especially in mental work.

Another aspect of the memory process is the retention of an impression on the mind, but mere memory, in the sense of psychological retentiveness, is not enough. To have it in a high degree is a great asset, but unless its stores are utilizable in an intelligent way a phenomenal memory is of little help, and may even be a hindrance. Many have questioned whether this power of retention can be improved in any way. Psychologists consider that any improvement can, at the best, be only slight.

Mental freshness, as opposed to staleness, is dependent on several factors. One of these is retroactive inhibition. If two tasks are learned in quick succession the acquisition of the second, to some extent, impairs the memory of the first.

Subconscious Elaboration

In the learning of any task a process of subconscious elaboration would appear to take place, and this occurs more readily in intervals of freedom from intensive conscious mental work. This subconscious elaboration is not infrequently evident in our dreams. Unfortunately, the elaboration or actual composition of a subject which takes place in dreams, and may appear to the dreamer in his dreaming hours to be of superior quality will on waking be found for the most part to be commonplace or even meaningless. Instances of a more fruitful kind of subconscious elaboration have been related by men of the rank of genius. It was de Maupassant who said, "ce n'est pas moi qui pense : ce sont mes idées qui pensent pour moi." And Helmholtz said "After the preliminary investigation of a problem happy ideas come unexpectedly without effort like an inspiration; they never come when my mind is fatigued or when I am at my working table; but frequently when on my walks through fields or woods on a bright day." Periods of freedom from conscious mental work may, therefore, be justifiable; many of us have noticed that our best ideas often come while we are engaged in some desultory activity involving no mental effort. The philosopher Hobbes kept a little notebook where at any hour of the day, he would enter the thoughts that darted into the mind from the fringe of consciousness. Graham Wallas recommends any one living a life of intellectual production to do as Darwin did, and keep a folder in which to place stray thoughts which interested him; Osler also speaks of carrying a notebook in which he made jottings while

travelling, or when thoughts occurred to him at odd moments.

As a corollary to the above it may be said that too continuous book reading is not mentally beneficial, for it does not promote habits of reflection and of observation, and leads us to depend on facts and thoughts "spoon-fed" into us. Independent observation, and, wherever it is practicable, definite research to find out for ourselves the secrets of nature, are the best corrective.

Into the acquisition by memory of facts and truths more enters than mere psychological retentiveness. One frequently observes advertisements of methods for improving the memory. Even if it be admitted that innate retentiveness can be increased, which is doubtful, improvement in our powers of memorizing must depend chiefly upon the multiplication of associations. Many of the advertised tonics for invigorating a feeble memory utilize this fact, and ingenious mnemonics and figure alphabets form the most frequently recommended schemes. Such ingenious methods occupy more time than they are usually worth.

Value of Mental Associations

The number of associations that a newly acquired body of knowledge can form in one's mind depends in great measure on the amount and character of previous acquisitions possessed by the student. One of the most important factors in developing a good memory is the multiplication and verification of previous ideas and experiences. To take a very simple example, in preparing for an important examination it is unwise to use only one text-book. While one text-book should be the mainstay, reference to others may present new viewpoints or facts in a somewhat different aspect and in such a way that new associations will be formed for the material gleaned from the staple volume. Still more important is a discussion of the subject in all its bearings with fellow students. "If a man confer little," says Bacon, "he had need have a present wit."

In attempting acquisition of new knowledge certain devices may prove of value. The grouping of the material to be learned into serviceable unities is an advantage. The presence of rhythm makes memorizing easier. To acquire interest in the subject is of importance. We remember best what interests us most; and special interest increases the power of observation as well. It frequently happens that when a name or word which we do not seem to have encountered before, attracts our notice and interests us, it crops up frequently afterwards in our reading. Furthermore, under the influence of interest we select, often without realizing it, items and facts that we remember,

but much should not be left to this more or less instinctive selection.

Too much slavish routine reading, too much ploughing through masses of more or less unnecessary and irrelevant texts, omitting nothing lest anything be missed, the reading of every page of inferior works of fiction produced by a good author is, as we have stated previously, not beneficial. "Some books are to be read only in parts, others to be read but not curiously, and some few to be read wholly with diligence and attention." Closely related with interest is the mental attitude of the student to the subject. Too many sit down to a book or a problem without troubling to form a definite notion of what they expect to get out of it.

The best memory is possessed by the man who makes the greatest number of associations with past work and experience, but the most effective memory is a combination of associations with selection. The man who thinks over his experiences will possess the best memory. This marks the distinction between crammed information and real knowledge of the subject. In cramming one does not think; few associations are formed. Real knowledge involves the organizing of associations, formed under the influence of continued interest and careful selection.

Much better, however, than a slavish devotion to the minutiae of one subject is a study less minute but more comprehensive of several subjects. It has frequently happened that outstanding contributions to one science have been made by men trained in another and who have

in consequence approached the subject from a new and fruitful aspect. Physicists have contributed much to astronomy, chemists to physiology, and mathematicians to many subjects. The absence of a narrow specialism should be one of the glories of medicine.

Associations can be multiplied, not only between cognate fields of knowledge but within each field itself. We have mentioned discussion and debate, and the reading of different books in the same field. There is another most efficacious method and that is to write upon a subject. Writers of monographs not infrequently acknowledge the great benefit which they themselves have received. Writing a coherent and lucid description of a subject is a great advance on any attempt to memorize a text-book account of it. A valuable exercise is the writing of a paper on some piece of original work. The reading of the original articles on a subject is a pleasant and stimulating variant to poring over text-books, and was frequently recommended by Osler to his students. Original work is less cut and dried and dogmatic than text-book essays, and leads to questioning and to an open mind. Finally, method, in the sense of orderliness, is a great asset, not only in the acquirement of learning but in its serviceableness afterwards. The method to be adopted must vary with the individual and with the nature of the subject to be mastered. Some lay stress on regularity of working hours. Certainly, habit facilitates the slow dead heave of the will and overcomes the inertia existing in the most willing people at the beginning of any task.

MOLLUSCUM CONTAGIOSUM IN TURKISH BATHS.—C. G. Crowley, who records three illustrative cases, states that Malcolm Morris, Crocker, and Hutchinson drew attention to the association of Turkish baths and molluscum contagiosum in England. Molluscum contagiosum is very rarely encountered in Australia, so that the incidence of three cases in two days recently seen by Crowley at Melbourne is very unusual. In each case the patient had attended the same Turkish bath a week or so before the eruption appeared. The proprietor of the baths was accordingly warned of the necessity of boiling towels, mats, and similar material, and of treating the slabs with steam and disinfectant.—*M. J. Austral.* p. 806, June 15, 1929.

IMMUNIZATION AGAINST TUBERCULOSIS.—M. Beck has protected guinea-pigs against infection by virulent human tubercle bacilli by repeated inunctions of a tubercle ointment, which was prepared from subcultures of originally highly virulent human tubercle types which had lost the power to cause tuberculosis, yet possessed in high degree an immunizing and healing action on tubercle-affected organs. A series of twenty-three guinea-pigs were inoculated subcutaneously with an emulsion of highly virulent human tubercle bacilli; three of these were regarded as controls. After tuberculosis had been established in all the animals, according to clinical and microscopical evidence, the remain-

ing twenty animals received, during a period of several weeks, six to ten inunctions of the ointment into the previously shaven skin. The guinea-pigs were killed after various intervals of nine days to one month. Tubercle bacilli were detected in three instances, but in the remaining animals, many of which had enlarged glands, tubercle bacilli were not found. The three control animals not treated with inunctions survived a longer period, all being dead after seven months, and all showed presence of tuberculosis in the lungs, liver, and spleen.—*Münch. med. Woch.* p. 1082, June 28, 1929.

AGRANULOCYTOSIS, WITH RECOVERY.—W. B. Blanton states that agranulocytosis is an uncommon condition, although more than fifty cases have been reported since Schultz first described it in 1922. Its principal manifestations are a bleeding ulcer of the mouth with a membrane simulating diphtheria, enlargement of the liver and spleen, occasional swelling of the inguinal lymphatic glands, ecchymosis, and herpes. The blood count shows a marked leucopenia, often less than 1,000 white cells being present. The polymorphonuclears are affected, their number falling to 1 or 2 per cent. More than 90 per cent of the cases were fatal. Blanton records a case, in a man aged 60, in which recovery ensued, although the white cells numbered only 1,000 and the polymorphonuclears were only 4 per cent.—*J. Am. M. Ass.* 93: 2099, June 22, 1929.

Association Notes

OFFICERS OF THE GENERAL COMMITTEE: BRITISH MEDICAL ASSOCIATION MEETING AT WINNIPEG, AUGUST 26-29, 1930

Chairman: - - - - - Dr. W. Harvey Smith

Hon. Secy.: - - - - - Dr. J. D. Adamson

Hon. Treas.: - - - - - Dr. C. A. MacKenzie

Committee on Appointments:

Dr. W. Harvey Smith	Dr. J. D. McQueen
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Dr. R. R. Swan	Dr. J. D. Adamson
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Dr. Bruce Chown

General Supervisor—Committees: - - - - - Dr. J. C. McQueen

General Supervisor—Sections: - - - - - Dr. O. S. Waugh

GENERAL COMMITTEE:

Representatives at Large:

Dr. G. F. Stephens	Dr. D. S. MacKay
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Dr. T. G. Hamilton	Dr. A. Gibson
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Dr. W. L. Mann	Dr. J. E. Lehmann
----------------	-------------------

Dr. J. D. McEachern	Mr. H. B. Shaw
---------------------	----------------

Mr. John McEachern	Mr. J. L. Hewitt
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Special Executive:

Dr. E. S. Moorhead	Dr. D. F. McIntyre
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Dr. F. A. Young	Dr. Spurgeon Campbell
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Dr. R. D. Fletcher	Dr. W. Rogers
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Military:

Dr. J. A. Gunn.

COMMITTEE CHAIRMEN AND SECRETARIES

1. Printing, Publicity and Publishing Committee: *Chairman:* Dr. Ross Mitchell
Secretary: Dr. P. G. Bell
2. Entertainment and Dinners Committee: *Chairman:* Dr. R. R. Swan
Secretary: Dr. Lennox Arthur
3. Reception Committee: *Chairman:* Dr. G. S. Fahrni
Secretary: Dr. Digby Wheeler
4. Finance Committee: *Chairman:* Dr. C. A. MacKenzie
Secretary: Dr. Digby Wheeler
5. Transportation Committee: *Chairman:* Dr. W. A. Gardner
Secretary: Dr. M. R. MacCharles
6. Hotel, Lodgings and Billeting Committee: *Chairman:* Dr. R. W. Kenny
Secretary: Dr. J. S. McInnes
7. Commercial Exhibits Committee: *Chairman:* Dr. J. C. McMillan
Secretary: Dr. E. H. Alexander
8. Scientific Exhibits Committee: *Chairman:* Dr. J. C. B. Grant
Secretary: Dr. D. Nicholson
9. Entertainment (Ladies) Committee: *Chairman:* Mrs. W. Harvey Smith
Secretaries: Mrs. Spurgeon Campbell
Mrs. Digby Wheeler
10. Auditorium Space, Sections and Offices Committee: *Chairman:* Dr. E. J. Boardman
Secretary: Dr. C. W. Burns
11. French-Canadian Committee: *Chairman:* Dr. R. Michaud
Secretary: Dr. L. D. Collin
12. Religious Service Committee: *Chairman:* Dr. H. M. Speechly
13. Laymen's Committee: *Chairman:* Mr. H. B. Shaw
Secretary: Mr. G. O'Grady

SECTIONAL VICE-PRESIDENTS AND SECRETARIES

(A) MEDICINE:	<i>Vice-Pres.</i> : Dr. Chas. Hunter <i>Secretary</i> : Dr. J. M. McEachern
(B) SURGERY:	<i>Vice-Pres.</i> : Dr. B. J. Brandson <i>Secretary</i> : Dr. A. P. MacKinnon
(C) OBSTETRICS AND GYNECOLOGY:	<i>Vice-Pres.</i> : Dr. D. S. MacKay <i>Secretary</i> : Dr. F. G. McGuinness
(D) BACTERIOLOGY, PATHOLOGY, PHYSIOLOGY AND BIOCHEMISTRY:	<i>Vice-Pres.</i> : Dr. Wm. Boyd <i>Secretary</i> : Dr. A. T. Cameron
(E) CHILDREN:	<i>Vice-Pres.</i> : Dr. Gordon Chown <i>Secretary</i> : Dr. O. J. Day
(F) MENTAL DISEASES AND NEUROLOGY:	<i>Vice-Pres.</i> : Dr. A. T. Mathers <i>Secretary</i> : Dr. E. C. Barnes
(G) OPHTHALMOLOGY:	<i>Vice-Pres.</i> : Dr. T. H. Bell <i>Secretary</i> : Dr. F. D. McKenty
(H) LARYNGOLOGY AND OTOLGY:	<i>Vice-Pres.</i> : Dr. S. W. Prowse <i>Secretary</i> : Dr. G. W. Fletcher
(I) PREVENTIVE MEDICINE:	<i>Vice-Pres.</i> : Dr. A. J. Douglas <i>Secretary</i> : Dr. T. A. Pinecock
(J) TUBERCULOSIS:	<i>Vice-Pres.</i> : Dr. D. A. Stewart <i>Secretary</i> : Dr. B. H. Olson
(K) RADIOLOGY:	<i>Vice-Pres.</i> : Dr. J. C. McMillan <i>Secretary</i> : Dr. Frank Smith
(L) HISTORY OF MEDICINE AND MEDICAL SOCIOLOGY:	<i>Vice-Pres.</i> : Dr. H. M. Speechley <i>Secretary</i> : Dr. J. C. B. Grant
(M) ANESTHESIA:	<i>Vice-Pres.</i> : Dr. W. Webster <i>Secretary</i> : Dr. D. C. Aikenhead

NOTE: All Chairmen and Secretaries of Committees, and all Vice-Presidents and Secretaries of Sections are also MEMBERS of the GENERAL COMMITTEE.

THE NEW MOTOR EMBLEM

As has already been noticed in the *Journal*, in accordance with requests from a large number of our members, Council has authorized the issue of a new motor emblem incorporating the familiar green cross which has become so popular in various parts of Canada.

The idea of using the green cross was suggested to the doctors when there was a gasoline shortage during the war. Sunday driving was discouraged and the green cross was then used by many medical men to indicate to the general public that such drivers had a legitimate reason for contravening this unwritten law by appearing on the streets on Sundays and holidays. Since then it has been widely adopted; provincial associations and the Canadian Medical Associations have used it as a windshield sticker at their annual conventions, and the Academy of Medicine, Toronto, has issued the plain cross stamped on aluminum as its official motor badge for several years. The members have found it to be of considerable advantage when they have been required to park in prohibited areas, or to exceed the time or speed limits; moreover, the cross has been found to be of material assistance in soothing the wrath of highway traffic officers.

The plain cross is now being manufactured by several individuals in Canada and the nearby States, and, in order to check this unauthorized

and possibly indiscriminate distribution, the Council decided to create its own design and so have a uniform badge throughout Canada. While this emblem bears the wording, "Canadian Medical Association," its use will be permitted to all licensed practitioners in Canada. It is felt that this evidence of the interest of the Canadian Medical Association in *all* of the doctors of Canada will act as a further incentive to them to join their national association.

These badges are of French bronze with the cross in an attractive green enamel on a light ground. A small caduceus in bronze is superimposed over the upright bar of the cross. Encircling the cross and its lighter ground is a border of dark red enamel through which appears in bronze the words, "Canadian Medical Association." The whole emblem is stamped to a convex contour to augment its appearance. It is perforated above and below, as well as laterally, to permit radiator wiring and has, also, two holes drilled through the border below the cross and at some distance apart to permit its rigid attachment by means of small bolts to the licence plate or to the transverse bar connecting the headlights.

This motor emblem will not supplant the present badge as the official emblem of the Canadian Medical Association, but has been designed to meet the needs of our members who desire a

badge combining both dignity and more ready recognition by traffic supervisors. With this in mind, the cost has been kept low by elimination of expensive detail. By a fortunate purchasing arrangement, these crosses are now available at

one dollar and fifty cents (\$1.50)—cost price—a remarkably low figure for fully enamelled emblems of this quality of workmanship.

Orders can be mailed to 184 College Street, Toronto.

Hospital Service Department Notes

PERTINENT NOTES ON HOSPITAL PLANNING AND CONSTRUCTION*

By B. EVAN PARRY, M.R.A.I.C.,

Supervising Architect, Department of Pensions and National Health, Ottawa

A picture of the hospital of sixty years ago has been given by Mr. Homer Wickenden, General Director of the United Hospital Fund, New York City. It had no well equipped accident room, no elevators, no electric light—only dim gas light or oil lamps. It had no x-ray department and no trained nurses in trim white uniforms. A patient had none of the advantages of a private room, because there were no private rooms. Whether he wished it or not, he would most likely find himself in an open ward with persons who were suffering from all kinds of diseases. Compare this statement with the estimate given by Dr. S. S. Goldwater, the eminent hospital consultant, wherein that gentleman states that approximately one million dollars per day are being poured into hospital construction at the present time, to provide private, semi-private and ward beds; individual toilets, baths, utility and storage rooms; examining, treatment and consulting rooms; ward laboratories; solaria; rooms for visitors; operating and maternity departments; out-patients' department with clinics; elevators; laundries, public waiting and reception rooms; emergency contagious units; power and heating plants; refrigeration and ventilation; sound deadening construction, and accommodation for nurses.

It is true that the cost of hospitals is an important item in the social budget, but, on the other hand, the public demands so-called necessities to-day which in the past would have been looked upon as luxuries.

It should be realized that hospital planning is a complicated art, that it involves grave social responsibilities and that the proper evaluation of the usefulness of a hospital building can not be made without much study. There is a growing feeling among the members of the medical profession that this phase of

hospitalization should be the subject of study—one might say intensive study—by those associated in human welfare, including members of the medical and nursing professions, sociologists, engineers and architects. Only by such means will the grievous blunders being made every day be averted.

The cost of a hospital is dependent upon three phases, i.e., its mass and arrangement; the quantity and character of its fixed equipment; the materials used in its construction. Therefore, a brief review of some salient features incidental thereto may be found illuminating.

The single room with a floor area of 2,400 square feet would appear to be the most economical plan for taking care of thirty patients. However, since the environmental needs of all patients in a numerous ward group are not constantly the same, and the separation of certain patients from the main group is desirable, modern hospital wards are frequently split into a number of separate rooms, each of which should be directly accessible from a common corridor; but the greater the subdivision of the ward, the greater the area of the interior corridor, every part of which must be added to the minimum ward area of 2,400 square feet. Here is a clear cut case in which the increased cost is accompanied by the parallel increase in ward efficiency, justifying the greater outlay.

Many will appreciate that a considerable portion of the floor area in a hospital is used for purposes other than the immediate care of patients. For instance, the regulation 8 foot corridor, if extended throughout the length of a rectangular building, say, 40 ft. by 200 ft., reduces the floor area by one-fifth of the total, which, together with the whole gamut of service rooms, would consume approximately one-half the total area. Consequently, the danger of referring in terms of measurement based on individual units, when deliberating upon a hospital project, can be appreciated, and a conclusion should only be arrived at after having given very careful consideration to the actual space required for beds, together with the additional space required for corridors, service rooms, etc.

Necessary equipment should be decided by administrative principles and intelligent planning. Balance may be taken as the key-note.

* Written specially for this *Journal*.

No one department should be overloaded at the expense of another; this can be prevented only by the co-operation and loyalty of the staff.

Members of the medical profession, as well as architects, have deplored the unsatisfactory equipment installed in many hospitals: refrigerator plants tucked away in dark corners; unsuitable piping services to plumbing fixtures, the fixtures themselves being pretty to look at, but absolutely worthless as a working commodity; the enormous expense contracted in lighting fixtures and arrangement generally. Why do we persist in fixing ceiling lights in patients' rooms? They should be eliminated and wall lights only installed. Why incur unnecessary expenditure for floor lights? Then, again, the extravagant waste indulged in for the finishings of walls and floors by using unsuitable materials, and, incidentally, destroying in a large measure the efficiency of the services. There is no doubt in the writer's mind that a lot of this waste could be avoided if the administrator of the hospital was a business man, equipped with good common horse sense, and strong enough to override the whims and fancies of his many advisers.

Insulation against climatic conditions and noise has been, and is being, sadly neglected in the construction of hospitals. It would be safe to say that not 5 per cent of the hospitals being constructed to-day are either properly insulated or sound-proof. Take for instance the consumption of fuel. Fifty per cent at least could be saved if proper constructive methods were followed, and, as to noise, certainly one would not hear on every hand the sad plaints of people who have been annoyed during their sojourn in the average hospital. Since measures are at hand whereby these defects can be overcome, surely it behoves all to make themselves acquainted with them.

Truth is dignity, and if this were fully realized, such atrocities as the fancy so-called up-to-date finishings in hospitals would never be tolerated. Fussiness above all things should be deleted, and a quiet restful environment provided.

The finishing of operating rooms has been given close study by outstanding men and it is to be commended that their findings have been followed in some of the newer hospitals of Canada, although, on the other hand, even today, white walls in operating rooms, unsuitable flooring, and abominable light and ventilation still obtain, with no justification whatsoever for such blunders.

With the common use of electricity in hospitals, dangers have increased, and one of the most outstanding may be found in the operating

theatre. The danger, from lack of safeguards, caused by combustible anaesthetics, electric cauterics, radio knives, high-frequency machines, and x-ray fluoroscopic equipment is not fully recognized, and, without exception, safe practice dictates the isolation of such equipment in the presence of combustible anaesthetics. The electric cautery, perhaps, presents a difficult problem, as its use is often imperative. However, this hazard might be overcome by resorting to non-combustible and local anaesthetics as far as possible, when the use of the electric cautery is demanded.

It can safely be stated that most of the accidents which have occurred have been caused by static electricity. Therefore, since the hospital operating theatre, of all places, should be such as to afford maximum security and protection, safeguards should be adopted. Each operating theatre should be provided with a system of humidification, the humidity in no case to be less than 60 per cent. Since the proper degree of humidity might vary considerably, it should be determined by actual tests under working conditions. The cylinder or other containers of combustible anaesthetics, mounted on portable trucks, should be so arranged that the complete unit is properly grounded. Door plates at entrances and exits of operating rooms should be thoroughly grounded; likewise any piping system used for conducting a combustible anaesthetizing gas into the operating room.

THE MUSTARD POULTICE A SUGGESTION

A reader has made a suggestion which leads one to believe that he, a surgeon of wide repute, has had the misfortune to be himself a patient and so had the unfortunate but highly valuable opportunity to study the practice of medicine from the viewpoint of the patient.

Despite the antiquity of the remedy, it is true that the vast majority of mustard poultices are still applied in a glacial state and garnished with frost to the most sensitive areas of our bodies. Unlike linseed, such a poultice is thin and quickly loses any initial heat.

It is suggested that more general observation of an improved technique be followed. While the mustard and flour are being mixed, two large plates should be heated either by hot water or by direct heat; the mustard poultice, which is usually covered by a thin layer of cheesecloth, gauze or muslin, should then be turned face downward on one heated plate, covered by the other plate, and so carried as a medium of mercy, not of torture, to the patient's bedside.

Provincial Association Notes

THE MANITOBA MEDICAL ASSOCIATION

"One of the most successful annual meetings of the Manitoba Medical Association ever held" was the verdict passed on the recent gathering in the Royal Alexandra Hotel on September 11, 12, 13, 14. At the same time, and also in this hotel, the annual meetings of the Manitoba Hospital Association and the Manitoba Nurses' Association were held.

The scientific program was chiefly in the hands of the Eastern visitors and their communications were received with great interest. Hon. Dr. E. W. Montgomery spoke on "Maternal mortality", pointing out how Manitoba's position had improved in the last two years. Dr. W. Harvey Smith touched on the preparations for the British Medical Association meeting in Winnipeg in 1930, and Dr. Jas. McKenty presented a clinical analysis of 400 cases of biliary tract disease.

At the luncheon on September 12th, Dr. Boardman delivered the presidential address, taking as his subject, "The municipal doctor". This was an able bit of constructive criticism, and is of such importance that it is hoped to publish it in full shortly. Dr. Boardman made six suggestions, which he amplified upon, as a basis for discussion at the proposed conference. They are as follows:

1. That a minimum salary be set. In the matter of salary, he declared that setting a maximum salary, such as has been done in Saskatchewan, "would be pernicious".
2. That the doctor be free to make the best ethical contract above the minimum for himself that is possible from year to year.
3. That the minimum salary be \$3,000 annually, provided the municipality supply livery both winter and summer; without this that the minimum salary be \$4,000.
4. That the municipal doctor, in every case and under all circumstances, be relieved from the collection of fees.
5. That the contract should provide for a minimum of two weeks' holidays annually, with pay.
6. That a post-graduate course of a minimum of two weeks every four years be imperative, in addition to the two weeks' holiday and also with pay.

Dr. Boardman's suggestions will be handed to the new executive committee of the Medical Association for its consideration.

The luncheon on September 13th was featured with an able address by Dr. T. C. Routley, Secretary of the Canadian Medical Association.

The business meeting was greatly speeded up to the advantage of all by having committee reports printed and available for review previous to the meeting. The election of officers resulted as follows:

President: Dr. Chas. MacKenzie, Winnipeg; *First Vice-president:* Dr. J. S. Poole, Neepawa; *Second Vice-president:* Dr. E. H. Alexander, Winnipeg; *Hon. Secretary:* Dr. F. W. Jackson, Winnipeg; *Hon. Treasurer:* Dr. D. C. Aikenhead, Winnipeg; *Members of Executive:* Dr. S. J. S. Pierce, Brandon; Dr. W. P. McCowan, Winnipeg.

An innovation was provided at the annual dinner in that the ladies met the men at dinner instead of the doctors and their ladies dining separately as in the past. The musical program was provided by two doctors' wives, Mrs. Blakie and Mrs. Etsell, who sang charmingly. Dr. Alex. Swan presided at the piano. Dr. Boardman introduced each of the Eastern visitors to the gathering.

A very pleasing feature of the luncheon on September 13th was the presence of Dr. Kerr, of Washington, D.C., a son of the first Dean of the Manitoba Medical College. In a brief speech Dr. Kerr expressed his pleasure at being present, and spoke feelingly of his father.

The great bulk of the program was presented by the distinguished group of speakers from the East who touched on varied subjects, all of interest to the general practitioner. To these gentlemen: Drs. Murphy and MacKenzie, of Halifax, Dr. A. T. Bazin, of Montreal, Drs. Geo. S. Young, H. B. VanWyck and Gordon E. Richards, of Toronto, the hearty thanks of the Manitoba doctors are due. The films shown were greatly appreciated.

On September 11th, the annual golf tournament was held at the Niakwa course. The M.M.A. cup, won by Dr. W. E. R. Coad, was formally presented to him at the annual dinner by Dr. E. H. Alexander. On Wednesday evening the President, Dr. E. J. Boardman, entertained the members of the Executive Committee at dinner.

THE ALBERTA MEDICAL ASSOCIATION

For the first time in the history of the Alberta Medical Association, this year's gathering was held at Lethbridge, in the far southern part of the province. It proved to be a delightful place in which to have a foregathering of the profession.

This meeting was a memorable one, not only because of the excellence of the program but

also by reason of the splendid efforts and organization by the local executive in the matter of hospitality and entertainment. The welcome addition of the Canadian Medical Association representatives contributed very largely to the success of the meeting. With Dr. A. T. Bazin, President, and Dr. T. C. Routley, Secretary of the Canadian Medical Association, and Dr. G. H. Agnew, of the Department of Hospital Service of the Canadian Medical Association, were Drs. G. H. Murphy, Associate Professor of Surgery in Dalhousie University; K. A. McKenzie, Associate Professor of Medicine, Dalhousie University, Halifax; G. S. Young, late Associate Professor of Medicine, Toronto University; G. E. Richards, Professor of Radiology, Toronto University; and H. V. VanWyck, Senior Demonstrator in Obstetrics and Gynaecology, Toronto University.

Dr. P. M. Campbell, of Lethbridge, as President of the Alberta Medical Association ably took charge of the meetings and the various functions. The annual banquet was held at the new Marquis Hotel, at which his Honour Lieutenant-Governor Dr. William Egbert, Dr. A. T. Bazin, Dr. T. C. Routley, and more than one hundred others were present.

The Lieutenant-Governor welcomed the representatives of the Canadian Medical Association from eastern Canada on behalf of the members of the Alberta Medical Association and the medical profession throughout Alberta. He remarked that these visits had proved profitable in the past, since ideas were exchanged, various viewpoints discussed and as a result a bond of friendship was created, all of which bound the profession more securely together. Dr. Egbert referred to the recent death of ex-Lieutenant-Governor Dr. R. G. Brett, and paid him tribute, not only because of his recognized ability in his profession but also because of his services in civic and professional life, which had contributed so much to the growth of this province. A silent tribute was paid to his memory by those present at this banquet. Dr. Egbert urged the members present to take a lesson from the life of Dr. Brett in the matter of rendering public service.

Dr. A. T. Bazin, in his capacity as President of the Canadian Medical Association, brought greetings from our national organization. He remarked that the co-operation of each and every provincial association was a vital necessity to the existence of the Canadian Medical Association. In Alberta, the medical profession was working along the right lines and he mentioned the names of Dr. William Egbert, the present Lieutenant-Governor, and that of the late ex-Lieutenant-Governor, Dr. R. G. Brett. In honouring these men the citizens of Alberta

have shown their faith in the medical profession. Dr. Bazin then brought up the question of state medicine. He referred to the fact that there are groups in every community, to whom medical assistance must be rendered, even though there is no recompense. It was in the matter of treating these so-called "submerged" groups, that the doctor did render service: in fact, hundreds carried out such altruistic services every day and of such beneficent work nothing is ever told. Such a group of patients are unable to pay for adequate medical attention, and physicians are finding it difficult to take care of this class, so large is it becoming, without the aid of some other social organization. It is here that state medicine comes in, and as a service organization the medical profession will have to study the project and will have to determine what other countries that have adopted this plan have found most feasible, and the profession may have to follow the suggestions offered. By this means the public will be served. At the present time *state aid* is furnished to the hospitals, and this could be extended further to *state medicine*, which is the one solution of the problem. It is the big question for the Canadian Medical Association to study at the present time, and already this body has taken steps to accomplish something in this connection. It is necessary that the Alberta Medical Association, as well as our other provincial organizations, get behind the scheme and each contribute towards the support of it, since it is both honest and fair.

Dr. T. C. Routley spoke of the relationship of the Canadian Medical Association to the medical profession at large throughout the Dominion. Physicians carried out their daily work as no other group did, and received little recognition for their services, and moreover were the objects of much complaint by the public. He urged our members to go back to their communities and take their rightful places there. He remarked that it was the duty of every doctor to assume his rightful place in the life of his community, so that in time when confidence grows when the voice of the profession speaks, people will stop to hear it—a recognized force. The time has arrived for the medical profession to stand together, to have a common voice which shall be heard all over the Dominion of Canada. He did not wish the western members to be under the impression that the representatives of the Canadian Medical Association there present brought superior wisdom. They were travelling across the Dominion and coming into closer personal contact with the members of different provincial associations, and in this way, hoped to bring about the consolidation of this great country.

Dr. Routley appealed to all the members of the Alberta Medical Association to join the Canadian Medical Association. He then referred to the meeting of the British Medical Association to be held in conjunction with the Canadian Medical Association in Winnipeg next August. He hoped that the Canadian medical profession would be well represented there.

During the several sessions of the Alberta Medical Association meeting highly instructive lectures were given by the different members of the visiting Canadian Medical Association group.

Dr. G. Harvey Agnew, of the Department of Hospital Service, emphasized the fact, that it has long been a tradition of organized medicine, that the interest of the general public is the interest of the medical profession. It has always been the aim of the members of the medical profession to prove to the public that they are their best friends. The Department of Hospital Service is in constant touch with trustees and governors of hospitals and has been able to see the medical profession from the outside as it were. Hence this department has been functioning as a liaison department. A study has also been in progress of the problem of small hospitals from coast to coast. During the past two years hundreds of requests for advice along these lines have been received and attended to. He urged physicians to organize the staffs of their hospitals, in order to hold frequent meetings and by these means pool their knowledge and experience, and crystallize their opinions in diagnostic and other problems. By getting together a hospital staff can do a great deal to help patients to improve their health. He outlined how these meetings could be made attractive. He urged physicians and hospital boards to get together at a luncheon to be held two or three times a year.

The subjects discussed and those who took part in the program of the meeting were as follows: "The chronic appendix," Prof. G. H. Murphy, Halifax; "The great instruments of precision in the diagnosis of heart diseases, *viz.*, the eyes, the ears and the fingers," Prof. K. A. McKenzie, Halifax; "Electrocardiography," Dr. W. W. Upton, Calgary; "Appendicitis" (unusual types with case records), Dr. L. S. MacKid, Calgary; "Vomiting of pregnancy," Dr. H. V. VanWyck, Toronto; "Hypertension," Dr. G. S. Young, Toronto; "Recent advances in the use of radium in the treatment of cancer," Prof. G. E. Richards, Toronto; "Body mechanics," Dr. F. Hastings Mewburn, Edmonton; "Potpourri. The pitfalls of practice," Dr. A. T. Bazin, Montreal; "Goitre," Dr. R. W. Lynn, Lethbridge; "Artificial immunity in tuberculosis," Prof. A. D.

Rankin, J. J. Ower, R. M. Shaw, H. M. Vango, Edmonton; "Interesting radiograms," W. H. McGuffin, Calgary; "Treatment of functional nervous diseases" Prof. K. A. McKenzie, Halifax; "Post-operative gastro-jejunal ulcer," Dr. G. E. Learmonth, Calgary; "Fracture of the neck of the femur," Prof. G. H. Murphy, Halifax; "The treatment of nephritis," Dr. G. S. Young, Toronto; "The treatment of eclamptic toxæmias," Dr. H. V. VanWyck, Toronto; "Gastrophtosis," Dr. D. S. Macnab, Calgary; "The liver and its ducts in disease," Dr. J. W. Richardson, Calgary; "The x-ray examination of the teeth and sinuses," Prof. G. E. Richards, Toronto; "Dominion medical service," Dr. Ross Miller, Ottawa.

The following officers were elected for 1929-1930:—

Past-President: Dr. P. M. Campbell, Lethbridge.

President: Dr. R. Parsons, Red Deer.

First Vice-president: Dr. T. R. Ross, Drumheller.

Second Vice-president: Dr. H. A. Gibson, Calgary.

Secretary: Dr. W. T. Henry, Fort Saskatchewan.

Treasurer: Dr. N. L. Terwilliger, Edmonton.

Executive Committee: Drs. M. A. R. Young, Lamont; J. E. Lovering, Lethbridge; Walter Park, Calgary.

Representatives on the Canadian Medical Association Council: Drs. L. J. O'Brien, Grande Prairie; H. H. Hepburn, Edmonton; W. A. Lincoln, Calgary; F. H. Sutherland, Peace River; R. W. Lynn, Lethbridge.

Editorial Board for the Canadian Medical Association Journal: Drs. G. E. Learmonth, Calgary (Chairman); H. Orr, and T. H. Whitelaw, Edmonton; H. C. Dixon, Medicine Hat; P. M. Campbell, Lethbridge.

G. E. LEARMONT

THE BRITISH COLUMBIA MEDICAL ASSOCIATION

The annual meeting of the British Columbia Medical Association was held at the Georgia Hotel, on September 25th and 26th, 1929.

An excellent program on a diversity of subjects was given by the eastern clinicians, whose visit was made possible by the generosity of the Canadian Medical Association.

Dr. Geo. H. Murphy, Associate Professor of Surgery, Dalhousie University, Halifax; Dr. K. A. MacKenzie, Associate Professor of Medicine, of the same university; Dr. Gordon E. Richards, Professor of Radiology, University of Toronto; Dr. H. B. Van Wyk, of the Department of Obstetrics and Gynaecology, University of Toronto; and Dr. George S. Young, Associate

Professor of Medicine at Toronto, were the speakers on clinical subjects. Accompanying these clinicians were Drs. A. T. Bazin, the President of the Canadian Medical Association; T. C. Routley, General Secretary of the Canadian Medical Association; Harvey Agnew, of the Department of Hospital Service; and Ross Millar, of the Department of Health, Ottawa.

Dr. Bazin and Dr. Routley talked on "Medical organization"; Dr. Millar and Dr. Agnew, on their respective departments.

A combined luncheon of the British Columbia and Vancouver Medical Association was held on both days.

A golf tournament, on Thursday, preceded the

annual dinner of the British Columbia Medical Association.

The following officers were elected for the coming year:

President: Dr. W. A. Clark, New Westminster

President-Elect: Dr. G. L. Hodgins, Vancouver

Vice-President: Dr. W. J. Knox, Kelowna

Secretary-Treasurer: Dr. W. T. Ewing, Vancouver.

The wives of the visiting members were entertained by Mrs. Wallace Wilson at the Jericho Golf Club at tea on Wednesday, and by Mrs. G. L. Hodgins at her home on Thursday. A dinner and bridge Thursday evening completed their entertainment.

W. L. GRAHAM

Medical Societies

THE TORONTO ACADEMY OF MEDICINE

The opening meeting of the Academy of Medicine, Toronto, took place on Tuesday, October 1st. As is the custom, the meeting was preceded by the annual dinner, at which the in-coming president, Dr. W. Warner Jones, presided. Amongst the guests of the evening were Sir William Mulock, Sir Robert Falconer, and Dr. McFarlane, who represented the Hamilton Medical Society.

The dinner was well attended. Short addresses were made by Sir William Mulock, Sir Robert Falconer, and Dr. McFarlane. After the dinner, the Fellows gathered for the stated meeting, and listened to the inaugural address of the President, in which he described the growth of the library, and stressed the necessity of the Fellows remembering the ever present need of money for the purchasing of books and periodicals. After the presidential address, Professor D. R. Keys, of the University of Toronto, gave a delightful and humourous talk on, "Reading other than medical," pointing out how necessary it was for the medical man to give some of his time to the cultivation of his imagination.

At the close of the evening a vote of thanks

to Professor Keys was proposed by Professor McMillan and seconded by Dr. J. H. Elliott.

The profession in Toronto and in the province are reminded that on Sunday, October 20th, the sixth annual St. Luke's day service will be held in the chapel of Wycliffe College. The procedure now followed in the holding of St. Luke's day service is that each year in turn the Fellows of the Academy march to some one of the College chapels situated in Queen's Park. All physicians are invited to attend.

The meeting at the Cleveland Academy of Medicine, staged by the Toronto Academy, will take place on November 15th in Cleveland. The Toronto Academy is providing a long and interesting program for the evening, while the hosts at Cleveland are arranging clinics and demonstrations for the following day. This meeting had been planned for an evening in May of this year, but was postponed when the news of the accident at the Crile Clinic was received.

During the month of September the deaths of the following members of the profession were recorded: Dr. J. A. Bedaid, North Bay; Dr. Wm. Douglas, Fort Erie; Dr. Wm. Gilpin, Brechin; Dr. J. M. Kenwood, Toronto; Dr. W. J. Robinson, London.

N. B. GWYN

UNDULANT FEVER.—Walter L. Bierring reviews and analyzes 150 cases of this disease and discusses its clinical history and treatment in detail. An accepted agglutination titre and the demonstration of *Brucella melitensis* variety *abortus* in pure culture in the blood stream should always be required for a positive diagnosis. For the present, symptomatic treatment offers the most for the patient with undulant fever, his activities being regulated by keeping him at rest in bed

as long as the febrile state persists, administering sedatives for insomnia, headache and other distressing symptoms, and, most important, giving an abundant nourishing diet. The convalescence is often prolonged over a long period and careful attention is necessary by means of psychic encouragement, physical therapy and other stimulating measures to insure a complete return to the normal state of health.—*J. Am. M. Ass.* 93: 897, Sept. 21, 1929).

University Notes

University of Toronto

Appointments to and resignations from the staff, session 1929-30:

Professor James M. MacCallum resigned as Professor of Ophthalmology and Head of the Department at the end of last session. He graduated in Arts in 1881 and in Medicine in 1886. He first became a member of the Faculty in 1892, following the late Dr. Thorburn as Professor of Therapeutics. Meanwhile, in 1903, he became Associate Professor of Ophthalmology and Otology. In 1914 he was appointed to the Chair of Ophthalmology, which position he held with distinction until his resignation in 1929.

Professor W. H. Lowry has been appointed Professor of Ophthalmology and Head of the Department. Professor Lowry is a graduate of the University of Toronto of 1901 and has been on the staff since 1912.

Professor D. N. MacLennan resigned from the Department of Ophthalmology in June, 1929. He graduated from Queen's University in 1891. Since 1912 he has been on the staff in Ophthalmology and at the time of his resignation held the appointment of Assistant Professor.

Professor Hardolph Wasteneys has been appointed head of the Department of Biochemistry. Professor Wasteneys has been on the staff since 1918, and takes the place of Dr. Andrew Hunter who resigned at the end of last session to become Professor of Physiological Chemistry at the University of Glasgow, Glasgow, Scotland.

Dr. George S. Young of the Department of Medicine has resigned. Dr. Young is a graduate in Arts and Medicine of this University and has been on the staff in Medicine since 1909. At the time of his retirement he held the rank of Assistant Professor of Medicine and that of Attending Physician in Charge of the Medical Out-Patient Department of the Toronto General Hospital.

Professor George Hunter has resigned to accept the position of Professor of Biochemistry at the University of Alberta. Professor Hunter has been Assistant Professor of Pathological Chemistry at this University since 1925.

Dr. Norman B. Gwyn resigned from the Department of Medicine at the end of the session. He was a Senior Demonstrator in Medicine. He graduated from the University of Toronto in 1896.

Registration for session 1929-30.

	<i>Men</i>	<i>Women</i>	<i>Total</i>
First year	104	6	110
Second year	100	13	113
Third year	114	9	123
Fourth year	132	17	149
Fifth year	126	9	135
Sixth year	93	15	108
Diploma in Public Health	14	..	14
B.Sc. (Med.)	5	..	5
Post-graduate	4	..	4
	692	69	761

Dalhousie University

The medical school of Dalhousie University has opened the new session with an enrolment of more than 160 students. This means that classes are filled to capacity, as it is the policy of the University to limit the size of classes so that there will be no crowding during the clinical years. A very large number of applicants for admission to both the first and advanced years could not be accepted.

Laval University

The number of students registered at the Faculty of Medicine, Laval University, Quebec, is as follows: first year, 52; second year, 55; third year, 52; fourth year, 38; fifth year, 44; a total of 241. No women were registered.

McGill University

The following are the figures for registration in the Faculty of Medicine for the session 1929-30.

	<i>Men</i>	<i>Women</i>	<i>Total</i>
First year	94	3	97
Second year	81	5	86
Third year	92	1	93
Fourth year	98	3	101
Fifth year	85	5	90
	450	17	467

University of Montreal

The following are the figures for enrolment of medical students in this university for the session 1929-1930:

Premedical	56
First year	57
Second year	56
Third year	34
Fourth year	33
Fifth year	42

Total 278

In this number there is one woman student.

Queen's University

There is a freshman year in medicine of 41, with a total registration of 292.

University of Western Ontario

This year there are 133 men and 15 women students in the Medical Faculty, making a total of 148, which is an increase of 11 over last year.

University of Manitoba

The Faculty of Medicine, University of Manitoba, has begun the winter's work with the following approximate registration. First year, 85, special student, 1; second year, 44; third year, 47; fourth year, 47; fifth year, 46; total, 270. In the first year nine of the students are sons of doctors.

Edinburgh University

It has been decided to reconstruct the University New Buildings of the Medical School, in Teviot Place, Edinburgh, at a cost of £60,000, and it has now been announced that promised gifts for this purpose include one of £35,000

from the Rockefeller Foundation, and another of £20,000 from Sir William Dunn's trustees, making a sum of £55,000 in all. This, together with other money which is available, now secures the carrying out in its entirety of a scheme drawn up by the architect, Mr. Balfour Paul, in consultation with the heads of the departments concerned, and the work will be begun in the summer vacation. The external aspect of the buildings, erected in 1880 from designs by the late Sir Rowand Anderson, will remain unaltered. Certain portions of the reconstructed building will in future be associated with the name of Sir William Dunn in recognition of the generous gift from his estate.

University of Witwatersrand

In connection with the recent meeting of the British Association for the Advancement of Science the University of Witwatersrand conferred honorary doctorates on seven of the visiting scientists. The recipients included Sir Thomas Holland, president of the British Association, and Professors J. S. Haldane, J. C. Myres, and D'Arcy Thompson. The capping ceremony was performed by Mr. J. H. Hofmeyr, Vice-Chancellor of the University.

Special Correspondence***The Edinburgh Letter***

(From our own correspondent)

Progress is now being made with the reconstruction of the University New Buildings, in Teviot Place. These buildings are "New" merely in name, to distinguish them from the massive architectural pile, the design of the elder Adam, in the South Bridge, which houses the main part of the University. Erected in 1880 from plans by the late Sir Rowand Anderson, these new buildings are almost entirely occupied by the various classrooms, museums, and laboratories of the medical faculty. They are situated immediately across the Middle Meadow Walk from the many mansions of the Royal Infirmary with its thousand beds. The external features of these buildings will be preserved in the scheme of interior reconstruction which has been drawn up by the architect, Mr. Balfour Paul, in consultation with the heads of the various departments. The cost of the project is assessed at £60,000. Of this sum, £35,000 is the gift of the Rockefeller Foundation, and £20,000 is from the trustees of Sir William Dunn, whose name will be associated with certain portions of the reconstructed building.

The Secretary of State for Scotland and the Minister of Agriculture and Fisheries have appointed Dr. T. J. Mackie, Professor of Bacteri-

ology in Edinburgh University, Chairman of a committee to investigate the origin, causes and dissemination of furunculosis and similar infectious diseases among salmon, trout and other fresh water fish in England and Scotland, and to conduct experiments with a view to ascertaining methods of combating the diseases.

The Lord President of the Council has appointed Sir James Walker to be a member of the Advisory Council to the Committee of the Privy Council for Scientific and Industrial Research. Sir James Walker retired from the Chair of Chemistry in Edinburgh University this year, which he had occupied since 1908. He was formerly Professor of Chemistry at University College, Dundee.

At the Imperial Social Hygiene Congress, an address was delivered by Dr. T. F. Dewar, C.B., of the Department of Health for Scotland, on the "Administrative control of venereal diseases in Scotland". Dr. Dewar said that it was certain that even to-day only a relatively small proportion of the cases of venereal disease received early efficient and adequate or sufficiently prolonged treatment. Even in 1916 modern treatment of syphilis was rare in the cities of Scotland, and all but unknown outside them. The Board's first endeavour was to tune up to efficiency the existing provision in the city hos-

pitals, and to provide effective clinics in hospitals in the larger towns. On a survey of the work of the last twelve years the general feeling was one of gratification. One could conduct a visitor from the South to any of the clinics in Scotland without fear of disparaging criticism. In the years ending May, 1922, and May, 1928, respectively the numbers attending the various clinics in Scotland, the number of new cases, and the total attendances were as follows:—

	1921-22	1927-28
Total patients	22,898	27,259
New patients	12,542	16,032
Total attendances	262,643	442,807

From these figures the magnitude of the work will be evident. Whatever may be the outcome as regards the lowering of the incidence of the venereal diseases, it cannot be doubted that the work has secured life, well being, and industrial fitness to many thousands who would otherwise have had to forfeit those things, and so has been of great value to the community.

The retirement of Sir Donald MacAlister, Bart., of Tarbert, the Principal and Vice-Chancellor of Glasgow University is announced. Sir Donald is one of the most brilliant of living Scotsmen. Senior Wrangler and First Smith's Prizeman at Cambridge he was elected a Fellow of his College where he afterwards became director of medical studies. He represented the University of Cambridge on the General Medical Council and in 1905 succeeded Sir William Turner, K.C.B., of Edinburgh, in the Presidential Chair. He has been Principal of Glasgow University since 1907. Since his appointment many new chairs and lectureships have been founded, not only at the University but also at the Royal Infirmary. Following upon the death of the Earl of Rosebery, the Chancellor of Glasgow University, it has been suggested that Sir Donald MacAlister will be appointed to the vacant Chancellorship.

In July, a new wing, consisting of two maternity wards, with nurses' accommodation, was formally opened at the Hospital, Stornoway, Lewis. This extension to the hospital in the Outer Isles is the gift of Mr. T. B. Macaulay, President of the Sun Life Assurance Company of Canada. In addition to presenting the new wing, Mr. Macaulay has endowed the hospital to the extent of £16,000. A further sum of £3,000 has been given to the endowment fund by Mr. John Bain, of Chicago, a brother of the Provost of Stornoway. In addition Mr. Bain contributed the sum of £4,000 towards the rebuilding of the Stornoway Town Hall, which was destroyed by fire some years ago. The Lewis Hospital, as well as those of Orkney and Shetland, has been provided with specially appointed surgeons under the Highlands and

Islands Medical Scheme of the Scottish Board of Health. This hospital supplies the needs of the 32,000 persons who live in Lewis and Harris. It will be remembered that Sir Alexander Mackenzie, the first white man to follow the Mackenzie River to the Arctic Ocean, and the first to cross the Continent of North America, north of Mexico, was born in Stornoway in 1763.

A new graduation hall has been presented to the University of St. Andrews by the generosity of James Younger, LL.D., a brother of Viscount Younger of Leckie, the former chairman of the Unionist Party. The final designs of the building were made by the late Paul Waterhouse, F.R.I.B.A., and the execution of the work has been carried out by his son Mr. Michael Waterhouse. The hall faces upon North Street and forms a noble and dignified continuation to the other University buildings in that street. The floor of the hall, exclusive of the stage, seats comfortably 624, and the main gallery 436. Advantage has been taken of the natural fall of the ground to place a large supper room, seating 80 persons, under the stage, with easy access and good natural light. In designing the hall the architect was confronted with many problems. It had to be suitable for a large variety of different functions and ceremonies—university graduations, speeches, and examinations, stage plays, cinemas and other performances. The floor of the hall, to the extent of 2,000 superficial feet, is supported on springs and specially designed for dancing. The cost of the whole building and site is approximately £95,000.

GEORGE GIBSON.

23 Cluny Terrace, Edinburgh.

The London Letter

(From our own correspondent)

It was indicated in the last of these letters that while the increase in the maternal mortality rates this year to the highest on record was causing anxiety, a great deal of work was in progress to cope with the situation. The British Medical Association, at Manchester, brought forward for the consideration of the representatives a scheme for a National Maternity Service which was passed almost without dissent, and now the Departmental Committee of the Ministry of Health appointed in May, 1928, to consider the working of the various midwives regulations, has issued its report. The last-named committee was asked to study not only the training of midwives but also the conditions under which they worked, and as three-quarters of the report deals with the latter point it follows that the recommendations overlap to a large extent the British Medical Association's scheme. Put briefly, the

latter scheme is to utilise the existent services of the general practitioner and the midwife through an extension of the National Health Insurance, so that a very large proportion of the population of mothers can be attended by a midwife with the services of a doctor guaranteed if and when required. Every pregnant woman will be examined at least once during the pregnancy by the doctor, and he will decide to what extent the midwife can safely undertake the antenatal supervision and conduct the labour in the patient's home. For the success of this scheme the training and education of midwives becomes a matter of great importance, since they will play a most dominating part in the new campaign. The Ministry of Health's committee recommends certain changes in the present methods of training, including an entrance examination, a clinical examination before certification, three months of hospital experience after certification, and post-graduate, or refresher courses, at intervals. With most of the recommendations, including these proposals, there is general agreement, but the suggestion that the Ministry should take over most of the functions of the "Central Midwives Board," the governing body of the profession, is causing great dissatisfaction. Legislation will doubtless be introduced at an early date, and it is hoped that the British Medical Association's very sound scheme will receive the attention it deserves.

The very exceptional summer weather enjoyed throughout the country this year is used by some authorities to point out that if only the beneficial rays of the sun could be continued through the winter months by artificial means much prevention of minor and even major ailments would result. While everyone who has a real interest in health is agreed that the abolition of smoke and the general creation of a healthy atmosphere are certainly to be striven for, there is still acute disagreement about the value of ultra-violet light administered to the child population in bulk at school and municipal clinics. The Medical Research Council's report last March indicated the need for scientific evidence on the value of ultra-violet rays, and the much discussed work of Dr. Dora Colebrook at Willesden is now available for more exact study in a complete report. Briefly, this

worker took a collection of healthy school children and divided them more or less by lot into three groups. One of these groups received ultra-violet rays treatment from naked arc-lamps; a second was exposed in exactly the same way, but with the ultra-violet element of the radiation screened off by window glass; while the third group received no treatment at all. The results were most carefully collected and analysed, and records were kept of the heights and weights, incidence and duration of colds and allied conditions, incidence of infectious fevers, occurrence of chilblains, progress in school work, and causes of absence during the period from August, 1927, to March, 1928. The findings show that there was absolutely no difference in the records for the three groups of children. As the report is careful to point out these negative findings only apply to experiments exactly similar to the present one, but so far there is no corresponding scientific evidence to refute these findings, and it is hoped that some clear thinking on the real value of artificial sunlight will result.

The State and voluntary organizations do a great deal for the blind in this country, but for the deaf the State does practically nothing, and voluntary organizations as much as the meagre support afforded to them allows, although deafness is by far the most widespread sensory disability in this country. It is true that special schools are provided by the State for deaf children, but after this no further interest is shown, while for the blind £600,000 is provided annually from rates and taxes, and the Old Age Pension is allowed at an early age. It is difficult to understand this attitude, and the industrial situation is such that the National Institute for the Deaf is pressing for an adequate and searching inquiry into the present position of affairs. This Institute is doing valuable work under considerable difficulties and it is hoped that its efforts will be rewarded. Blindness has always a very wide appeal to charitable people, but deafness can be an almost equally terrible affliction, and it is surprising that more notice is not taken of this section of our disabled folk.

ALAN MONCRIEFF.

London, 22 Wimpole St., W.1.

DIABETIC GANGRENE OF FACE.—G. Pratt Brooks, M.R.C.S., L.R.C.P., reports a case of diabetes, in which gangrene developed in an unusual site. The condition was resistant to treatment, and ran a fatal course of seven days, mercifully without severe pain. At the time of onset the patient was receiving insulin and dietetic treatment on usual lines. The first thing noted was a hyperæmic area immediately under the right orbit, which spread, similarly to erysipelas, from that

centre; the eyelids swelled up and occluded the eye, which became proptosed with orbital cellulitis. The other eye became similarly affected, while the skin changed to patchy, moist, black sloughs. A photograph, unfortunately, does not clearly show necrosed tissue. Coincident with the local condition, sugar and acetone reappeared in the urine.—*Brit. M. J.* 2: 539, Sept. 21, 1929.

Letters to the Editor

The Fellowship of Medicine and Post-Graduate Medical Association

To the Editor:

We should be grateful if you would insert this letter in your *Journal* for the benefit of medical men and women intending to visit England.

We have heard overseas post-graduates complain that London is so large, and so complicated, that it takes a few weeks to learn the way around; they also say that, unless they come armed with letters of introduction to physicians or surgeons, it is difficult to obtain the facilities they require. The Fellowship of Medicine was founded to overcome these difficulties, and overseas post-graduates should, as a matter of course, come direct to the Fellowship where, without any charge, they can obtain information, advice and assistance.

We can—and every day do—save time for overseas post-graduates who apply to us either before leaving their own country or on arrival in England.

It is frequently mentioned that foreign post-graduate schools are attracting many of our doctors on account of better organization, and we feel sure that this idea is prevalent owing to lack of advertisement of our own activities; hence, we are writing this letter to the Medical Journals in the British Empire. Increased support given to this organization by post-graduates means added facilities for study.

Perhaps the main point to be realized is that in England the Medical Year begins in October, and extends through the winter and spring until the end of July; August and September being the vacation months, opportunities for work are naturally somewhat curtailed, though the Fellowship endeavours to provide facilities for doctors who are only free for study during that time. We would add, however, that for

overseas doctors their arrival in England in August or September means that they will have ample time to settle down and become acquainted with London before starting work in earnest.

We have been told that the information chiefly desired by overseas practitioners is the dates of the various examinations for degrees and diplomas, and the dates, duration and opportunities for securing resident positions in London hospitals, as well as the facilities for special courses of instruction. All this information the Fellowship of Medicine is in a position to provide.

As far as the Fellowship itself is concerned, opportunities for clinical work all the year round are provided in the forty London hospitals with which it is associated, as well as the special courses shown overleaf, and also weekly (free) lectures during the winter months, and weekly (free) clinical demonstrations (except during August and September). In addition, the Fellowship publishes monthly the "Post-Graduate Medical Journal" (6/- per annum post free) containing post-graduate lectures, clinical demonstrations, reports of cases, and information on the various courses of instruction. Above all, however, the Fellowship endeavours to help in every way possible medical practitioners requiring advice and assistance, by acting as a central bureau of information, and, of course, no charge is made for this service.

All enquiries should be addressed to the Secretary, Fellowship of Medicine, 1, Wimpole Street, London, W.1.

Yours faithfully,

H. W. CARSON,

Chairman of Executive Committee.

Sept. 12, 1929.

UNDULANT FEVER.—The characteristics of *Brucella melitensis* organisms have only recently been fully described. A. V. Hardy feels that a classification of strains isolated from human beings cannot now be regarded as a reliable index of the importance of the different varieties as a cause of human disease. A special effort should be made to obtain a detailed post-mortem study in all fatal cases of undulant fever. The pathological lesions and clinical signs of *Brucella melitensis* infections in animals show a definite correlation. The epi-

demiological data, based on the reports of more than a thousand recent cases of undulant fever in the United States, indicate that cattle and hogs with contagious abortion are the source of these infections. Macroscopic agglutination tests on patients with febrile illnesses of undetermined etiology should be made more frequently. Additional study is essential in order to determine effective and applicable methods of control.—*J. Am. M. Ass.* 93: 891, Sept. 21, 1929.

Topics of Current Interest

NEOSALVARSAN AS A PULMONARY ANTISEPTIC

Interest in chronic lung diseases and the applications of surgery to their treatment has been greatly stimulated by Dr. R. A. Young's masterly review of this subject in his Lumleian Lectures delivered in London in March of this year.* Of such conditions there are few that demand greater care and judgment on the part of the physician than that of empyema, particularly when streptococcal in origin, and of chronic bronchiectasis. In the former there is general agreement that too early operation may and in fact usually does lead to that troublesome condition, chronic empyema. This result of treatment by open operation has led many workers to treat such cases by continuous aspiration, with or without irrigation of the cavity with some form of antiseptic solution. That most usually employed has been Dakin's solution—neutral 0.5 per cent solution of sodium hypochlorite—though others have also found their advocates. Recently Dr. Hans Edel† has recorded a few cases which he has treated with intrapleural injection of neosalvarsan. His treatment has been to aspirate the pus through a needle of moderate size, using the same needle to inject at once a solution of neosalvarsan. Edel has found that the pleura is able to withstand large doses of this solution without undue reaction; thus his usual initial dose has been 0.45 g. dissolved in 10 c.cm. distilled water, which is gradually increased up to 0.6 g. according to the general reaction and the degree of refilling of the empyema. The surprising tolerance shown by the pleura to such high dosage suggests to Edel that considerable local thrombosis occurs round the site of the injection. It is, of course, well known that neosalvarsan even in far weaker solutions is a powerful antiseptic, especially against streptococci, and it is natural that the attempt should be made to utilize it at the site of infection instead of in the blood stream alone. Edel has gone further and has injected solutions of similar strength (from 0.15 to 0.6 g. dissolved in 10 c.cm. of water) into the bronchial tree in cases of bronchiectasis. His method has been similar to that used for the introduction of lipiodol into the lung, namely, cocaineisation of the trachea and direct injection through a laryngeal catheter. In the few patients he has so far treated Edel reports con-

siderable success, the total quantity of neosalvarsan used being in one case as much as 5.25 g. Another patient suffering from right-sided pulmonary gangrene and empyema received in all 0.9 g. into the pleura and 2.7 g. into the lung, a total of 3.6 g. The patient became afebrile two days after the first injection and in 12 days the empyema had disappeared, "cure" resulting in seven weeks, though the x-ray still showed some thickening of the pleura. The local application of arsenical bactericides in pulmonary conditions is a method to be watched with interest, although clinicians may hesitate to copy the high dosage employed by Dr. Edel until further results have been reported.—*The Lancet*, 2: 32, July 6, 1929.

THE MUSEUM OF THE ROYAL COLLEGE OF SURGEONS

The annual report on the museum of the Royal College of Surgeons of England issued by the conservator, Sir Arthur Keith, includes the reports of the curators of the several departments, together with a general survey of the year's work by the conservator. In the latter special mention is made of those who have contributed specimens to the museum during the year, and it is satisfactory to find that so large a number of medical men, not officially connected with the museum, take an interest and pride in it. On the pathological side the curator, Mr. C. F. Beadles, F.R.C.S., reports the addition of over a hundred and fifty new specimens; these, with the additions to other departments, will be on view in Room I of the museum from July 4th to July 27th. Special mention is made by the curator of the numerous additions to the brain and nerve series and to those of the thyroid and pituitary glands. There are also some beautiful preparations illustrating von Recklinghausen's disease, which by themselves are well worth a visit to the museum; and many individual specimens of conditions of which the opportunities for study are infrequent, such as the results of bone grafting for tuberculous disease of the spine, osteoporosis of the skull from diet deficiency, a condition resembling leontiasis of the cranium following injury, and mediastinal teratoma. A comparatively new department is that of palaeopathology, dealing with prehistoric diseases. This is a subject in which Sir Arthur Keith takes a special interest; he has already secured the aid of many possible donors in various parts of the country, and in this way has accumulated a nucleus for a section of British palaeopathology. A notable contribution to this

* *The Lancet* 1: 593, 697, and 805, 1929.

† Die Lokalbehandlung eitriger Lungenprozesse mit intrabronkalem Neosalvarsan-injektionen, Med. Klin., 929, April 26th.

section is due to Dr. Wingrave of Lyme Regis, who has presented a number of specimens of fossil vertebræ of the extinct reptilia; these represent the earliest traces of disease which have so far come under the eye of the geologist. In the department of human osteology Miss Tildesley has made progress in the cataloguing of the collection of human crania. When this work is completed the collection will form a valuable standard of reference in determining the racial affinities of excavated human remains. Many interesting specimens have been added in the physiological department; among these may be mentioned a series of dissections of brains of the higher primates, showing the relative development of the basal ganglia in relation to the expanse of the cortex. From these dissections it appears that in the human brain the basal ganglia have undergone as great a progressive expansion as the cortex. The curator of this department, Mr. R. H. Burne, F.R.S., has continued his investigations on the component of the vascular system of bony fishes, which was discovered by him; and several researches of interest have been carried out by other investigators. Under the care of its honorary curator, Sir Frank Colyer, the odontological section is now one of the most progressive and rapidly expanding parts of the museum; every effort is evidently being made by him to render the collection representative in every detail. In the historical department Mr. C. J. S. Thompson, the honorary curator, is able to report the addition of a large number of surgical instruments, most of them presented by that indefatigable antiquarian, Dr. F. W. Cock—*Brit. M. J.* 1: 1171, June 29, 1929.

THE ENEMIES OF RESEARCH

Most of us are inclined to treat the activities of the antivivisectionist with a certain detachment, for they do not interfere with the work of the ordinary practitioner. The research worker who has suffered directly from these attacks has no such philosophic attitude, and Prof. A. V. Hill seized the opportunity of his Stephen Paget Lecture to the Research Defence Society on June 10th to return a Roland for their Oliver, and to attack the whole spirit which informs opposition to man's painful progress. Too few, he said, realize fully the facts of man's gradual evolution; most people still think that Adam arrived full grown a few thousand years ago, with a complete university education and a degree in zoology. He drew a vivid picture of Nature's age-long experiment in living things by expressing them in the scale of a single lifetime. In that notation it had needed 49 years for man to learn to settle down in villages. Halfway

through his fiftieth year he had learned to write; Christianity had been his religion since the middle of April of that year; printing had been invented a fortnight ago, steam less than a week, cars about a day, and wireless for a few hours. We are yet far from Utopia, said Prof. Hill, but the gradual progress of knowledge has improved men's lot and character and outlook in the last half-million years and may reasonably be expected to continue to improve them in the next 50 million. To the scientist, as to most reasonable men, that heritage of painfully acquired knowledge is a sacred thing. In Prof. Hill's words, "The capacity for knowledge, for understanding himself and his environment, is man's essential characteristic and his alone; to deny him the exercise of this fundamental gift would be an unpardonable, an almost unthinkable offence." To Prof. Hill antivivisection is "only a passing phase in the varying follies of mankind, while the fanatical desire to obstruct the advance of knowledge for one or other cause is a permanent factor in man's mental constitution, a mild form of mental disorder which has expressed itself from time to time in various hideous forms, in cruelty and persecution, in hatred and malice, in the perpetual treachery of hindering mankind in his slow and pathetic efforts to climb the ladder of civilisation. He instanced an "Anti-Rail-Road Journal" published in 1835, supported by the most worthy institutions and claiming to "fight only on the side of truth for the exposure of the railway system." Prof. Hill illustrated his lecture with a selection from a hundred letters he had received from antivivisectionists; most of them were incredible and many unprintable. "I know a gentleman living in Compton-street that has had two of his pussies stolen by your bloodhounds," ran one, and another: "From personal observation I have noticed a vivisector becomes a seducer, an abortionist, and a potential murderer"; while a gentleman in E.12 wrote: "In my particular circle of friends we are doing all in our power to prevent any further subscription being sent to any hospital." On May 24th last the Parish Paper of St. Jude's-on-the-Hill, Hampstead Garden Suburb, contained an appeal from the Rev. B. G. Bourchier to intelligent people to take the opportunity of the general election to put an end to the waste of public money involved in medical research. "When," declared the lecturer, "by telling lies and spreading calumnies, by petty persecution in private or malicious persecution in the police-courts, by attempting to forward legislation forbidding the use of snails, lobsters, and frogs for research the antivivisectionist provides a wanton hindrance to the advance of knowledge, the matter ceases to be a joke, and if he tries to hinder the work of hospitals my blood begins to

boil." He traced the desire to injure or kill those whose opinions differed from one's own through the Old Testament and the Middle Ages, instancing Galileo and other persecuted scientists. The Inquisition, at any rate, he observed, did not commit murder by proxy, but the anti-vaccinationists had declared that the death of Stephen Paget was a direct answer to their prayers. Prof. Hill put forward a vigorous defence of the work of hospitals and research departments and a plea for scientific tolerance combined with continuous scepticism of theory. His concluding words will be echoed by all who believe in evolution. "There are enemies of knowledge in all classes and categories and parties. We should be a great brotherhood unbroken by frontiers and national hatreds. If there is one thing in the world that should be international it is the pursuit of knowledge . . . Individual freedom from molestation is the hard-won basis of modern civilization; so it is with the advance of knowledge. Modesty, friendliness, humanity, and a reasonable sense of humour are the basis of human welfare."—*The Lancet* 1: 1263, June 15, 1929.

BIOPHYSICAL ASSISTANTS

The Society of Apothecaries of London, at the instigation of the British Medical Association, is taking steps to establish a roll of persons of guaranteed training and competency to whom medical men can confidently issue prescriptions for treatment by electricity or irradiation. An approved course of training will be required of all technicians who desire to be placed on the register, and all applicants after May 31, 1930, will be required to pass an examination; the details of the requirements in these respects have not yet been issued. Meanwhile, following the tradition of similar schemes of qualification, technical assistants of approved standing and experience may be admitted to the roll, the main requirement being two or three years' practice in an approved institution. This is by no means an extravagant demand and it may possibly prove to be too lenient. Registered members on the roll will on their side undertake to conform to various professional obligations, the most important being that they will not undertake the treatment of any patient except under the direction and control of a registered medical practitioner. The mechanical and technical apparatus of medicine has become so complicated that there is bound to be a progressive movement in the direction of this scheme for technicians. Clinical laboratories are also catered for by the Pathological and Bacteriological Laboratory Assistants Association which, in collaboration with the Pathological Society, issues certificates

of proficiency to technical assistants who can satisfy stringent requirements of training and knowledge, tested by examination.—*The Lancet* 1: June 1, 1929.

BOOTS AND SHOES

One of the disadvantages of civilization is to be found in the degradation of the human foot which is caused by the use of footgear. Many writers have pointed out the evils wrought by boots and shoes, and by stockings, too, for that matter, and many an essay has been written on the proper form and material of foot covering. The last contribution to the literature of this subject comes from Dr. J. D. Adams,* of Boston, who holds views on the footgear of the child which are sound as far as they go, but hardly seem to go far enough. A study of the history of boots and shoes and of the current practice in shoeing of many peoples all over the world, such as was in part attempted in our columns by Mr. Muirhead Little† in 1914, shows that, with the exception of sandals, all footgear tends to cause abduction of the great toe and gradual loss of the power of voluntary adduction of its phalanges. The Greek or Roman sandal with a thong between the great and second toes did not have this pernicious effect, and the same is true of certain sandals worn in India and elsewhere at the present time. The most primitive form of protection was probably a strip of the skin of an animal or some flexible leafs and the result of winding this or any other bandage round the foot and toes would be abduction of the great toe, involving in time loss of the support afforded by its phalanges. This tendency is evident in Red Indian moccasins, some of which are quite sharply pointed. The early Highland brogue, which was made out of a single thickness of deer's or other hide, had the same defect. The loss of the power of voluntary abduction of the hallux is incurred quickly because of the comparative feebleness of the so-called abductor hallucis and the mechanical disadvantage under which it acts, losing, as it does, all power of adduction after the first phalanx is abducted so that its long axis is a continuation of that of the metatarsal bone. But it is not only the great toe that has suffered from footgear. As soon as man added a stiff sole to the more or less sock-like moccasin or brogue, or made the sandal stiff, the muscles began to atrophy and the complicated musculature of the foot to lose its raison d'être. Every normal child appears to be born with active foot muscles and joints, but in every shoe-wearing adolescent the process of degrada-

* *J. Am. M. Ass.* 93: 1753, May 25, 1929.

† Boots and Shoes from Historical and Surgical Points of View, *The Lancet* 1: 1738, 1914.

tion and atrophy is gone through, until the foot becomes no more than a lever hinged at the ankle and jointed at the toes. Dr. Adams figures the radiogram of a "foot in a properly fitted shoe," but even in this a degree of hallux valgus is apparent. Such deformity is, we fear, unavoidable in all boots and shoes, and despite the provision of shoes of which the soles have straight or incurved inner edges, the hallux necessarily pressed upon at the metatarsophalangeal joint declines to avail itself of the space provided. We regretfully conclude that unless digitated stockings and sandals with toe-thongs become our only wear, we must have a more or less abducted great toe. Even the athlete's running shoe is badly shaped. Those that we have seen do not allow for adduction of the hallux and in so much sacrifice the support and propulsive leverage of the great toe.

Men's boots and shoes may be bad, but, if so, what epithet of depreciation is strong enough for the shoes of women? Now that all females are ladies, the workers among them have aped the fashions which were popular with the wealthy idlers of past generations who rode in carriages and did but little walking on their high heels and pointed toes. It is astounding that so few complain out of the millions who now for several years have been defying nature in this way.—*The Lancet* 1: 1 June 15, 1929.

CANADA'S OLDEST DRUG STORE

A drug store with nearly six score years of history is one at the corner of Queen and Grafton Streets in Charlottetown, Prince Edward Island. The building, still called Apothecaries Hall, stands on the site of open where Thomas Desbrisay began business in 1810. He was a son of the celebrated Rev. Theophilus Desbrisay, of whose descendants there are still very many in the province in the gulf.

This curious old announcement was distributed at the time the drug store was opened,

"Thomas Desbrisay, Junior,

Informs the public that he has opened
an Apothecary's Shop

In Charlottetown and intends to supply the medical wants of the inhabitants in general, where he offers for sale a variety of genuine drugs and medicines.

"He is sorry that from various and unexpected disappointments his supplies have not been so extensive as he had expected and that for the present the sale of some articles is unavoidably limited to smaller quantities than he intended. However, as he intends to conduct his establishment in future on a more general plan he will take care regularly to be sufficiently pro-

vided with everything required in his line of business.

"Families in the country remote from medical assistance may be supplied with medicines together with written directions as to their uses and applications.

N.B.—Prescriptions made up with accuracy and despatch. Cow pox inoculation.

"Heads of families for their children, and all others desirous of availing themselves of the benefit of the Cow Pox inoculations are informed that the subscriber has lately received a supply of genuine matter.

Thomas Desbrisay, Junior.

N.B.—The poor will be inoculated free of expense.

Dec. 24, 1810."

The old advertisement unwittingly gives us a glimpse into the early colonial life of Prince Edward Island and the last little postscript gives a key to the interest in the "cow pox" situation at the time and a pioneer effort at prevention of disease among the unfortunately poor.—Blodwen Davies in *Saturday Night*, Toronto, Aug. 17, 1929.

HINTS TO WRITERS

Lt.-Col. J. H. Woods, editor of the *Calgary Daily Herald*, has prepared a very complete and useful "Style Book" for the guidance of his staff of writers.

Col. Woods is one of the leading newspaper men in Canada. He has been the head of the Press organizations in Canada, and is now Chairman of the Canadian section of the Empire Press Union. He has taken a leading part in all Imperial Press Conferences.

Col. Woods produced his "Style Book" at a recent conference of newspaper men at Toronto. "We have all been talking about it, but you have done it," they told him. Col. Woods observed that he did not know that such a guide to newspaper English and directions to the staff existed in any newspaper office in Canada or the United States.

Primarily intended for reporters and other writers for the newspaper, of course, a few points in the "Style Book" strike the eye of such a character as to be valuable not only to newspaper men but to all who indulge in literary composition, whether scientific or otherwise. They may very well be reproduced.

Short sentences and short paragraphs are commended. The following directions should be displayed in the boldest type in every newspaper office:—

"Accuracy, terseness, and fairness are the three fundamentals in newspaper writing. Kill your adjectives without mercy."

The "Don't" list includes the usual common errors, such as:—

- "Over" for "more than."
- "Secure" for "obtain."
- "Concensus of opinion" for "consensus."
- "Aggregate" for "total."
- "Balance" for "remainder."
- "Cultured" for "cultivated."
- "Donate" for "give."
- "Notice" for "observe."

All very sound inhibitions. The Americanism "onto" is among the other words banned.

In the rules for constructing "news stories" there are directions which apply equally well to all writing. Thus:—

"Be direct. Nine times out of ten an introduction is pure trash. The simplest form is the best."

"Use the active instead of the passive voice. It gives force to what you say. Put the adverb after the verb for the same reason."

"Use familiar words, write naturally. The

most forceful position of any word is at the beginning of a sentence. The next forceful position is at the end of a sentence."

There are several columns devoted to directions regarding capitalization and abbreviations. Practice varies in these matters in different newspaper offices. The Times, observing etymological accuracy, uses "z" in "capitalisation" and in words ending with the sound of "iz" or "ise," and this practice is followed generally in Canada and the United States.

Grammar and punctuation receive special attention from our mentor from the prairies. A reasonable course is adopted in regard to our old friend the split infinitive, which by the way, has slipped into the "Style Book." The rule laid down is to "use the split infinitive only when it adds strength to the expression." Examples are given of illiterate blunders which must be avoided, and advice offered on use of compounds, apostrophes, and all punctuation marks.

"Don't overwork the dash. Usually a comma will do as well."

Abstracts from Current Literature

MEDICINE

The Use of Calcium Chloride Given Intravenously in Congestive Heart Failure.

Stewart, H. J., *Am. Heart J.* 4: 6, Aug. 1929.

It has long been known that the calcium ion is essential to the contraction of heart muscle, dating from the observation made by Merunowicz in 1875 that perfusion with the aqueous extract of ash would keep up the contraction of the heart. With the establishment of this fact, and of the part played by potassium in relaxation and sodium in maintaining the osmotic pressure in the muscle tissues, an attempt was begun to connect the action of digitalis with the presence of these ions. The conclusions on the question varied. Clark's experiments led him to belief that the systolic action of digitoxin on the frog's heart depended on the presence of calcium ions, whilst other observers brought forward evidence to the contrary.

Further investigation by Loewi brought out the suggestion that a strophanthin (or digitalis) effect consists only in making the heart muscle receptive to calcium ions, and this increased receptiveness is followed by an increased calcium effect. In other words, digitalis bodies sensitize the heart muscle to the action of the calcium already present in the blood. He believed that the proportion of calcium was not lowered in heart failure, but the sensitiveness of the heart muscle to calcium was diminished. The same result was said to be attained if the calcium in

the blood was temporarily raised by intravenous injections.

Investigations were then carried out by a number of workers with regard to the value of intravenous injections of calcium chloride in congestive heart failure, and excellent results were reported. It was found that diuresis was promoted to a striking degree by this measure, and it was even more marked when digitalis was given at the same time, either orally or intravenously.

The present paper deals with two points: (1) whether calcium chloride in the amounts administered has an effect on the contraction of the heart muscle in man; and (2) its diuretic effect in congestive heart failure.

The results with regard to (1) may be briefly summarized as follows: calcium chloride was given on 7 occasions to 4 patients in whom the cardiac rhythm was normal and on 4 occasions to one patient suffering from auricular fibrillation. In no single instance was the extent of contraction of the left ventricle influenced by the drug. It was also administered on 5 occasions to 3 of the patients with a normal rhythm who had previously been given digitalis, and on 6 occasions to 2 patients with auricular fibrillation who were also receiving digitalis. No effect on the extent of the ventricular contraction resulted in any of these cases either. Nor could it be shown that the force of the heart beat was altered by the calcium chloride. Finally, electrocardiograms taken in connection with the

injection of the salt showed no changes in conduction time or in ventricular rate.

What were the results of calcium chloride as a diuretic? It was given to 12 patients with oedema, both with and without digitalis. In one case there was a marked diuresis, but the patient was so ill that it was difficult to control the observations in his case, and later in his illness diuresis was obtained by the use of digitan alone. The conclusion reached on this point was that calcium chloride did not produce diuresis in congestive heart failure: and digitalis did not appear to be any more effective as a diuretic in these patients when given in combination with the salt than when it was given alone.

It is worth noting that experimental results in dogs had been that large quantities of the calcium chloride *did* give rise to premature ventricular contractions, and if the doses given to patients had been comparable to the quantities used with dogs effects might have been detected other than the negative findings recorded. It did not seem wise, however, to give patients larger amounts than one grm.

H. E. MACDERMOT

The Increased Mortality Rate of Cancer. Eggers, H. E. *J. Cancer Res.* 12: 9, 1929.

The author points to the fact that the alleged increase in the mortality from cancer has been explained as due to more accurate diagnosis and the prolongation of the life span. More people are now being preserved, to reach the cancer age, it is said. An attempt is here made to clear up the question whether the increased mortality rate in cancer is actual or only apparent by comparing the available figures with those appertaining to what are often called the "degenerative diseases", e.g., angina pectoris, chronic rheumatism, gout, cirrhosis of the liver, etc.

The author argues that if cancer has become more common because more people are reaching the cancer age, then the group of degenerative diseases should also show a parallel increase. He has investigated this point laying stress on the fact that conclusions should be based upon a study of the "group" degenerative diseases, in order to rule out any special factor that might influence one member of the group.

Studying the annual mortality reports of the U.S. Census Bureau for the period 1900 to 1924, the graph showing the ratio of the cancer incidence to that of degenerative diseases is a straight horizontal line from 1900 to 1918, indicating a practically identical rate of increases during that time for cancer and the degenerative group. From 1918 to 1924 a discrepancy occurs, attributable to the influenza epidemic. The mortality rate for cancer quickly returned to its original level, but that for degenerative diseases had not been re-established by 1924, owing

mainly to the reduction in the number of deaths from chronic nephritis resulting from the influenza epidemic, and, to a lesser extent, to the reduction of deaths from diabetes. The rectilinear increased incidence of cancer is held to be a true increase, since if it was due to better diagnosis there would have been an increase in the cancer rate beyond that of the degenerative group, provided that it was not compensated by an actual decrease in the cancer rate.

A. G. NICHOLLS

The Care of the Surgical Diabetic. Ohler, W. R., *New Eng. M. J.* 201: 259, Aug. 8, 1929.

Generally, a surgical diabetic is a severe diabetic. The presence of sugar or diacetic acid is no contra-indication to surgical procedures. The presence of pus always increases the severity of diabetes. A case of general septicæmia may be kept sugar free with insulin, but insulin is of no help in halting the spread of the infection. Every septic wound in a diabetic should be seen every day by the visiting surgeon. The carefully bandaged, mildly gangrenous, toe may give rise to a septic foot and leg within twenty-four or forty-eight hours. Beginning coma in a non-surgical diabetic may present the symptoms of an acute surgical condition in the abdomen. In diabetic coma the skin is always dry and the patient nearly always has nausea and vomiting and a leucocytosis. The most important single service in the proper care of the surgical diabetic is to supply the patient with a competent special nurse, or to detail one of the ward nurses to the special care of the patient. Provision should be made for the frequent testing of the urine for sugar and diacetic acid on the ward. This is of much greater value than collecting a twenty-four hour specimen and waiting until the next day for the report.

On the day of operation the patient receives from 30 to 50 grams of glucose in the form of oatmeal gruel or orange juice at least two hours before operation. If the patient is receiving insulin give the morning dose as usual at the time of the glucose meal. During the operation keep the patient warm. In the severe case it is desirable to give 1000 c.c. of saline solution subcutaneously before the patient leaves the table.

Immediately after operation, start rectal tap water. Test the urine within the first hour and give insulin if necessary. Test the urine every two hours subsequently for the first twenty-four hours. Give insulin whenever necessary. Test the urine every four hours during the second day. Test the urine every six hours during the third day, which means three times a day before meals and at 10 p.m. Start fluids by the mouth as soon as possible. If fluids cannot be taken by the mouth carbohydrate in the form of glucose, by rectum or intravenously, should be

given. The patient should get at least 50 grams of glucose in the first twenty-four hours.

LILLIAN A. CHASE

Isolation of Tail of Pancreas in a Diabetic Child.

De Takats, G., and Wilder, R. M., *J. Am. M. Ass.* 93: 603, Aug. 24, 1929.

De Takats is reporting elsewhere experiments on dogs which bring additional evidence of the persistence, hypertrophy, and function of the islet tissue in the tail of the pancreas after separation of the tail from the body of the gland. The islets in the severed tail develop to an unusual size; mitotic figures appear in many sections.

This evidence raised the question whether hypertrophy of the islets and increased islet function could be brought about in a case of diabetes. A case was selected in whom the diabetes was considered to be beyond the stage when improvement from medical management could be anticipated. He was a boy aged 13, who first had glycosuria in 1921. His progress is here tabulated.

Date	Height (inches)	Weight (lbs.)	Calories in diet	Dextrose in diet (grm.)	Blood sugar	Insulin	Complications
March 1923	48	44	1435	98		15	
June 1923							Sore throat
Aug. 1923	48	55	1435	98	0.217	20	
Aug. 1924	50	58	1435	98		40	
Jan. 1926							Abscessed tooth
Feb. 1926	52	67	1435	98	0.312	40	Tonsillitis twice
Ju'y 1927	53	72	1854	120		40	Tonsillectomy
Jan. 1929	56	87	1854	120	0.045 at 12.15 p.m. 0.089 at 5 p.m.		

He was taking insulin in four doses, 15-5-15.

On January 20, 1929, the operation was performed. With an electro-surgical cautery the pancreas was divided as close to the midline as possible without endangering the inferior mesenteric vein. Recovery was satisfactory until the eighth day when the patient had abdominal colic. The abdomen was opened and a mass explored and drained of greenish yellow fluid, pancreatic juice. About four weeks later it was necessary to again open the abdomen in order to drain an abscess above the splenic flexure. His further progress is here tabulated.

Date	Weight	Calories in diet	Dextrose value of diet	Insulin	
March 27	69	1854	120	39	Reaction at 1 a.m.
April 3	73	1854	120	38	One reaction in week
April 11	78 1/2	1854	120	38	No reactions
April 17	74 1/2	1854	120	38	
April 26	78 1/2	1854	120	38	Two reactions at 11 a.m.
May 2		1854	120	36-32	Two reactions.
May 9	80	1854	120	27-25	Reactions
May 17		1854	120	33	
May 25	80	1854	120	34	
June 4	2177	166	45		Reaction
June 18	2177	166	39		
June 27	80	2177	166	39	

Reviewer's comment. This was evidently one of those unstable cases that seem to balance uncertainly between glycosuria and hypoglycaemia. The most difficult problem in treatment is that of dividing the dose to make it effective. His fasting blood sugar at the time of operation is not given; it was probably high. There is no record of a fasting blood sugar since he had the abscessed tooth in January, 1926. His noon blood sugar at the time of the operation was low at 0.045 grm. per 100 c.c. In some patients a blood sugar as low as that would result in a reaction. No reactions are noted before the operation. In the six years since treatment began he gained forty-three pounds in weight and grew eight inches. His diet was increased 419 calories. His weight was within one pound of the normal, and his height was within two inches of the normal for his age. In four and a half years his insulin requirement has not increased and his diet was increased 419 calories. His morning dose of insulin could have been decreased or his breakfast could have been higher in food value, to combat the noon hypoglycaemia. Suppose the islet tissue in the pancreas increases rapidly and the boy has too great a production of insulin will not his last state be worse than his first? It was a daring and original piece of surgery. Further reports of the boy's progress will be awaited with interest.

LILLIAN A. CHASE

Intrakutane Schweißinjektionen und Tuberkulose. (Intracutaneous Injections of Sweat and Tuberculosis). Dorn, E., *Zeitschr. f. Tuberk.* 51: 134, 1928.

The author states that the sweat of tuberculous persons, like their urine, contains antigenic substances. Acting on this belief, he tried intracutaneous injection of the sweat in 171 cases, and finds that the idea is supported by the facts in 81.3 per cent. The local reaction obtained is specific for tuberculosis. No general or focal reaction results from the test. A positive test signifies active tuberculosis; a negative one, in most cases, excludes active tuberculosis. The reaction is of diagnostic value, except at the beginning of active tuberculosis.

A. G. NICHOLLS

SURGERY

The X-Ray Treatment of Wounds. Freund, L., *Brit. M. J.* 2: 449, Sept. 7, 1929.

The beneficial influence of x-rays is due either to the stimulating effect of small doses or to the elimination of some factor delaying cicatrization.

Lupus vulgaris, epitheliomata, rodent ulcers, keloids, and pigmented nevi are treated by the author as follows: The affected area is

excised surgically. Without suturing, the wound is then treated by x-rays, immediately and on several successive days. By this method pathological masses are rapidly got rid of and what cells are left are more readily reached by the radiation. If the growth recurs it can easily break through the thin soft scar resulting from the above treatment. A recurrence is thus recognized earlier than if the wound were sewn.

The cosmetic result is good. Less time is required for treatment. Wounds in areas where the skin remains stretched are most suitable. If the wound is near a joint, the area under treatment has to be rendered immobile. Lesions in folds or angles of the skin are unsuitable for this treatment. Fairly extensive wounds treated in this manner have given good results. One is mentioned having a diameter of ten centimetres. Healing is not delayed.

A dose slightly higher than an epilation dose is given, about 6 to 7 H, unfiltered.

R. V. B. SHIER

Mortality of Enterostomy in Acute Ileus. Van Beuren, F. T., Jr., *Ann. Surg.* 90: 387, Sept. 1929.

Not until the public and the profession realize that delay in acute ileus means danger will the mortality curve fall. Among technical procedures affecting beneficially the mortality rate enterostomy has been warmly advocated. The author gives two series of late cases, one with, and one without, enterostomy, and compares the mortality. The series are further divided into three periods of four years each.

The time divisions show that the diagnosis of acute ileus is being made earlier and more often. Also that the mortality has been reduced in the last four years, and that enterostomy is being done about three times as often as in the first four years of the series. In the first four years the mortality rate in late cases (after forty-eight hours) was 81 per cent. In the last period it was 61 per cent.

Enterostomy done at the right time is the most effective means known at present for overcoming intestinal over-distension and anaemia.

R. V. B. SHIER

Résultats immédiats de quatorze thoracoplasties pour tuberculose pleuro-pulmonaire. (The immediate results in fourteen cases of thoracoplasty for pleuro-pulmonary tuberculosis). Morin, Cardis, et Picot, *Rév. Méd. de la Suisse romande* 48: 999, 25 nov., 1928.

The following statistics are given. Seven patients appeared to be cured. Cough had ceased and tubercle bacilli had disappeared from the sputum. Six had had a total thoracoplasty and one a partial thoracoplasty. Four patients were improved, but were still expectorating bacilli.

In the case of one, operated on for pyopneumothorax by total thoracoplasty, the suppuration had almost entirely cleared up. Two patients died; one from bilateral extension of the tuberculous lesions, and one from pleuro-pulmonary perforation.

The authors reserve the operation of thoracoplasty for those cases which show a very marked tendency to spontaneous fibrosis of the lesions, and, also emphasize the moral effect of the operation.

A. G. NICHOLLS

GYNAECOLOGY

Fifteen Years with Radium in the Treatment of Fibroids, Non-Malignant Bleeding and Dysmenorrhœa. Polak, J. O., *J. Obst. & Gynaec. Brit. Emp.* 36: 325, 1929.

The value of radium in the treatment of carcinoma of the cervix is well established, but in non-malignant bleeding its indications and value are less clearly recognized.

In most uterine fibroids the treatment of choice is operation. If, however, the tumour is smaller than the uterus in a three months' pregnancy, radium may be used, and is to be preferred if the patient is a poor operative risk. It is however contraindicated in fibroids complicated by pelvic inflammation, or if the tumour is causing pressure symptoms, or if the diagnosis is at all doubtful. In the series reported less than one-third of the fibroids were radiated, and in these the dose varied from 1,800 to 2,000 mgm. hours.

Where the cause of the menorrhagia is subinvolution or fibrosis uteri the intrauterine application of radium seldom, if ever, fails to effect a cure. Excessive irregular bleeding, even at the menopause, always demands investigation, and if malignancy is not present the simple application of radium after the curettage gives very satisfactory results. Should haemorrhage recur after a period of amenorrhœa, hysterectomy may then be necessary.

In young girls, suffering from menorrhagia and a resultant anaemia, a hypertrophic endometrium is usually found. This condition may also be treated successfully by curettage followed by a small well-screened dose of radium. (200-300 mgm. hours). In the case of patients so treated, who later became pregnant, no defect was found in the child.

ELEANOR PERCIVAL

Leucorrhœa with Special Reference to Trichomonas Vaginalis. Davis, C. H. *Am. J. Obst. & Gynec.* 18: 196-203, 1929.

Leucorrhœa is perhaps the most common of gynaecological complaints. The cause of the abnormal discharge may be: (a) parasitic or infective; (b) local; (c) constitutional; (d) cir-

culatory. *Trichomonas vaginalis* is a flagellate parasite, which, if sought for in fresh secretion, will often be found to be the cause of persistent very irritating vaginal discharges. A mistaken diagnosis of chronic gonorrhœa is sometimes made.

In acute cases, treatment should include sitz baths, douches and rest. Later, when the acute stage has passed, a speculum should be introduced, the vagina carefully dried, and then painted with 5 per cent mercurochrome. Following this, a glycerine tampon is inserted, and if advisable, the patient uses a lactic acid douche. This treatment is carried out four times a week, until all the parasites have disappeared and the vaginal mucosa is healthy. Sometimes an alkaline powder "Bisodol" is effective. As this *T. vaginalis* infection of the vagina may be associated with intestinal infection by the same parasite, the bowel should be kept open and the patient advised to wash with soap and water after stool. The patient should be examined for several months after menstruation, and a negative slide obtained, before being pronounced well.

ELEANOR PERCIVAL

PEDIATRICS

Icterus Neonatorum. Goldbloom, A., and Gottlieb, R., *Am. J. Dis. Child.* 38: 57, July 1929.

Recent advances in knowledge of blood destruction, bile formation, and function of the reticulo-endothelial system, together with the discovery of techniques for determining the degree of bilirubinaemia allow the vexed question of the etiology of icterus to be studied more critically and investigated with more precision of method than heretofore.

Goldbloom and Gottlieb discuss the numerous conflicting theories of the etiology of icterus neonatorum and present data to show that jaundice of the new-born is "a physiological condition which is the result of a postnatal readjustment from an environment requiring the presence of a polycythaemia for the maintenance of oxygenation to one in which no such extraordinary measures are necessary."

The fact that the umbilical cord blood in all cases gives an indirect van den Berg reaction shows that every child at birth, whether visibly jaundiced or not has icterus—which is defined as an increase of bile pigment in the blood serum.

Ten samples of oxalated cord blood were placed in test tubes in a refrigerator and red cell counts were made at frequent intervals. At the end of 144 hours nine tubes showed complete hemolysis, while the tenth showed a like result somewhat delayed. In tubes of adult blood little or no change occurred. Red cell counts on peripheral blood of newborn infants

showed an initial polycythaemia with an early rapid fall over the first four or five day period, followed by a rise.

Of 39 samples of cord blood 37 showed increased fragility of the red blood corpuscles. Identical curves were obtained when the fragility test was done with cord blood at birth, with cord blood exposed to physiological saline, and with cord blood exposed to maternal serum. The peripheral blood of newborn infants showed in nearly every case an increased fragility of the red corpuscles which decreased until after one week the curve paralleled that for the normal adult.

Blood smears showed a marked increase in nucleated and reticulated red cells in the newborn with an almost total disappearance of these immature forms about the end of the first week of life. Study of the unhemolized portions in the fragility experiments showed that these immature cells were largely responsible for the increased fragility. It was noted that the disappearance of these young cells from the peripheral circulation coincided with the assumption of a normal fragility curve, thus pointing to a direct relationship between immature circulating cells and fragility.

The indirect van den Berg test was positive in all of 34 samples of cord blood, and the peripheral blood of all infants examined showed an increased icteric index. Icterus neonatorum is a physiological condition present in all newborn infants in varying degrees. Its association with the disappearance of the polycythæmia and of the immature red cells, with the increase of fragility of the red cells, with an indirect van den Berg reaction and a high icteric index indicates its haemolytic origin and nature. The peculiarities of the fetal circulation impose a condition of oxygen want on the fetus; the bone marrow is thereby stimulated to the increased production of red cells; with birth, conditions due to prenatal anoxæmia must be adjusted to a new environment of normal oxygen tension; excess red cells are destroyed; a haemolytic icterus results.

A. K. GEDDES

Pathology of So-Called "Acute Pyelitis" in Infants. Wilson, J. R., and Schloss, O. M., *Am. J. Dis. Child.* 38: 2, 1929.

Wilson and Schloss demonstrate by a study of post-mortem material from 49 children under three years of age, all of whom had shown well-marked pyuria during life, that the most common cause of severe acute pyuria in young infants is an acute inflammation of the kidney substance. Lesions in the renal pelvis were infrequent and relatively insignificant; lesions in the kidney tissue varied from small circumscribed areas of mononuclear and polymorphonuclear-celled infiltration to frank abscess formation with necrosis, and in old healed cases

scar tissue. In 22 of the 28 cases, in which the pyuria had been ranked as mild or moderate, focal inflammatory lesions of the interstitial tissue of the kidney were found; in all of the 17 cases in which the pyuria had been severe, necropsy revealed acute suppurative nephritis; in the three cases of pyuria with recovery, which subsequently came to autopsy as a result of extra-urinary infections, scar tissue was found in the kidneys.

None of the 49 cases showed any marked congenital anomaly of the urinary tract. There was no great preponderance of females over males. The demonstration of acute suppurative nephritis as the common cause of pyuria in infants lends support to the view that the infection is haematogenous and explains the ineffectiveness of the usual therapy.

A. K. GEDDES

ANESTHESIA

Pre-Medication by Paraldehyde in Children.
Sington, H., *Proc. Roy. Soc. Med.* 22: 1197, 1929.

The terror which some children experience when given an anaesthetic may permanently damage their nervous systems. The ideal plan, when a child has to be operated upon, would be to anaesthetize him while he is asleep. The writer gave paraldehyde in a series of one hundred operations upon children. The dose was one drachm to every fourteen pounds of body weight. It was given per rectum. The patients fell asleep within half an hour and

were given ether without being awakened. They all slept for nine or ten hours afterwards. Only one child vomited after operation. Another was noisy and obstreperous after waking up. With these two exceptions there were no bad after effects. The patients varied in age from sixteen months to twelve years, and were selected because they were obviously excitable and nervous.

W. B. HOWELL

Guérison d'une Syncope Anesthésique par l'injection Intrarachidienne de Caffeine après Echée de l'adrenaline intracardiaque. (The Cure of an Anaesthetic Syncope by Intraspinal Injection of Caffeine after Failure of Adrenaline Injected into the Heart). Bloch, R., *La Presse Médicale* 35: 108, Jan. 23, 1929.

A woman of sixty-eight years of age was to be operated upon for an ulcerating cancer of the breast. General and local anaesthesia were both considered unsuitable. A spinal injection of 5 centigrams of scurocaine, mixed with 25 centigrams of caffeine, was given in the space between the last cervical and first dorsal vertebrae. Five minutes afterwards respiration and pulse failed. Adrenaline was immediately injected into the heart, but without effect. During two or three minutes artificial respiration was carried out, and then 50 centigrams of caffeine were injected into the sub-dural space where the first injection had been made. There was, at once, a deep inspiration and the pulse reappeared. The operation was carried out and convalescence was uneventful.

W. B. HOWELL

HUMAN OVA FROM UTERINE TUBES.—The material used by J. P. Pratt, Edgar Allen, Q. U. Newell, and L. J. Bland, for study was obtained from tubes removed in connection with fibromyomas and endometrial implants. Some tubes were washed *in situ* when none of the pelvic organs have been removed. When the tubes were not to be removed, the uterus was compressed by uterine elevating forceps applied just above the cervix. A small needle with a syringe attached was then introduced through the muscle into the cavity of the uterus. Salt solution was then injected into the cavity and allowed to run out through the tube. One tube was compressed with the fingers while the other was being washed. The fluid was collected as it ran out the fimbriated ends and was carefully searched for ova. This method is also useful to test the patency of the tubes. In the second method, when the tubes were removed at operation they were first dissected free from the mesosalpinx. A small cannula was fixed in the fimbriated end of each tube and then washed with physiological solution of sodium chloride. The washings were then examined for ova. Freeing of the tube seemed necessary, as otherwise there might have been a kinking which would have interfered with successful washing. The cases studied represented all stages of the menstrual cycle. The most suitable material was found at operations occurring near the middle of the intermenstruum. Nine specimens in all were obtained which on first ex-

amination in salt solution seemed to be ova. Five of them were definitely identified as ova by further study after fixation and section. One was obtained on the fifteenth day of the intermenstruum (fifteen days after the onset of the flow). Two others, which were twin ova, one obtained from each tube, were also found on the fifteenth day. A fourth ovum was obtained on the sixteenth day. This evidence therefore places ovulation before the fifteenth or sixteenth day. The twin ova were most nearly normal. Sections showed that these ova had already extruded the first polar body and had formed the second maturation spindle. The next specimen recovered also had formed a polar body before ovulation, although the maternal chromosomes could not be located. Another had two polar bodies. As the ovum fragmented during fixation and dehydration, this observation could not be checked in sections. These observations supply the first evidence as to the stage of maturation reached at ovulation by the tubal ovum of man, a point under controversy in the recent literature. Ovulation, dated from the onset of the previous menstruation, preceded the sixteenth day in one case, the fifteenth day in three cases and the fourteenth day in one case. These data further confirm the observation, based on the condition of the corpus luteum, that ovulation occurs most frequently at the middle of the intermenstruum.—*J. Am. M. Ass.* 93: 834, Sept. 14, 1929.

Obituaries

Dr. Stephen Rice Jenkins, F.A.C.S., Prince Edward Island's most distinguished physician, died at his home in Charlottetown, September 15th, after a brief illness. He was apparently in his usual good health until September 9th when he developed an acute cholecystitis. This was complicated three days later by the onset of pneumonia in the left lower lobe, which, in spite of a very gallant fight, brought the end on the evening of September 15th.

Dr. Jenkins was born in Charlottetown, November 12, 1858, the son of Dr. J. T. Jenkins, a prominent practitioner of that time. He obtained considerable medical training in his father's office both before and during his medical course, which he received at the University of Pennsylvania, graduating in 1884. After a year's internship in the Old Blockley Hospital, Philadelphia, he returned to practice in Charlottetown, immediately plunging into the hectic work of the 1885 smallpox epidemic. He remained in active practice here until his last illness.

His exceptional qualities of heart and mind gradually secured to him the largest medical and surgical practice on Prince Edward Island, which preëminence he maintained to the end.

A man of keen intellect, indefatigable energy, and ever youthful spirit, he managed, in spite of the heavy demands of his practice, to keep abreast of the latest advances in medicine; while his high sense of honour, kindly tolerance and mature wisdom won for him the affectionate esteem of patients and fellow practitioners alike.

An efficient executive, he was an active and valued participant in the councils of the Canadian Medical Association as well as of the local societies. His appointment to the presidency of the Canadian Medical Association for 1928 was a fitting recognition of his standing among his medical associates.

As a citizen of Charlottetown and Prince Edward Island he played an equally important rôle. Early associating himself with the local militia as medical officer of the 4th Regiment Heavy Artillery, he rose to the rank of Lieutenant-colonel, afterwards serving for a considerable period during the war as officer commanding Rockhead Military Hospital, Halifax. In 1912 and 1915 he was elected as Charlottetown representative to the provincial legislature. Interested in every movement that had for its purpose the betterment of hygiene, social and educational conditions he gave generously of his time and money. During his long career he was closely associated with both hospitals in Charlottetown, the local Red Cross Society, Anti-tuberculosis Society, Social Hygiene Council, City School Board and numerous other civic organizations,

all of which owe a great deal to his tireless energy and organizing ability.

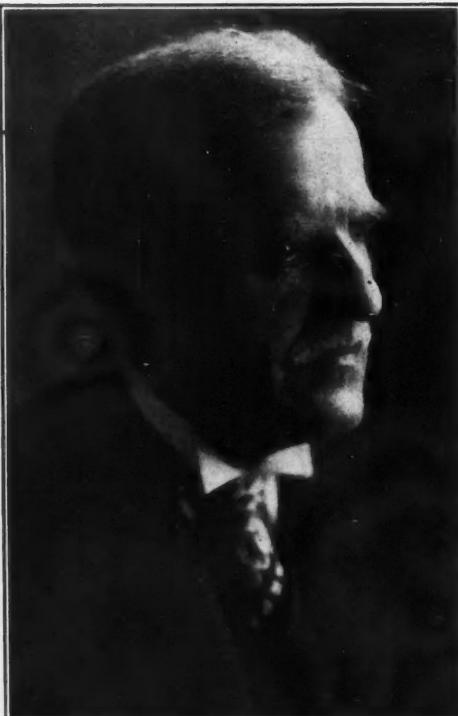
Dr. Jenkins' death has left a great gap in the medical and civic life of his native province. Through the passing years his memory will be cherished by all who knew him as the ideal citizen, the ideal physician, "A man who went about doing good."

The deceased leaves to mourn his widow; three sons, Dr. J. S. Jenkins and Charles Jenkins of Charlottetown, Harry G. Jenkins of Paris, France; also six daughters, Mrs. Ivan Reddin, Alberta, the Misses Nora and Hilda Jenkins of New York, and the Misses Margaret, Helen and Stephanie Jenkins of Charlottetown.

J. W. MCKENZIE

AN APPRECIATION

The death of Dr. Stephen Rice Jenkins is regretted not only by his professional confrères but by people in every walk of life in this city and province and throughout the Dominion. Actively engaged in his professional work on Monday, September 9th, indisposed the same day, on Tuesday confined to his home, on Wednesday endeavouring to see his patients, on Thursday stricken with pneumonia, on Friday and Saturday with the resources of both hospitals at his disposal, he fought a great but losing fight, and on Sunday, September 15th, he passed to his reward. The writer was intimately acquainted with Dr. Jenkins for many years and can testify that his advice and counsel, whether in the home or hospital, were always highly prized. His activities in Red Cross work, social hygiene and education, are well known, but it was as a general practitioner that he climbed to the highest pinnacle in his profession. His skill as a physician and surgeon could only be attained



Dr. Stephen Rice Jenkins

by constant visits to great centres of learning, by keeping abreast of the times, and the application of his knowledge. He will be missed in the local medical society, in the medical Council, of which he was Registrar, in the Canadian Medical Association, of which he was President last year, and in the organizations of both hospitals, where his advice was always invaluable. In a word, the profession has lost a very capable, careful, and successful practitioner, and his associates in private life will greatly miss a companion possessing the kindly, genial qualities of Dr. Jenkins. In conclusion, his standing as a physician may be summed up in the words of Robert Louis Stevenson: "Among the men and classes of men who stand above the common herd, the physician easily occupies first place. He is the flower, such as it is, of our civilization, and when this stage of man is done with and only to be marvelled at in history, he will be thought to have shared as

little as any in the defects of the period and notably exhibited the virtues of the race. He possesses in a marked degree generosity, tact, discretion, and what are more important, herculean cheerfulness and courage, so that he brings air and cheer into the sick room and often enough, though not as often as he wishes, brings healing."

G. F. DEWAR

The Hon. Dr. R. G. Brett. With the passing of the Hon. Dr. Brett, western Canada has lost her best known physician, who for a period of nearly forty years was intimately associated with the medical and political affairs of the west. His death was not unexpected, as he had for some time been in failing health. He died at the Holy Cross Hospital, Calgary, on September 16th at the age of seventy-eight years. He was a man of fine character, of strong yet most genial personality, fine mentality, with an ever present sense of humour which won him many friends and which must have carried him through many a difficult situation. The medical profession of Alberta mourn his loss, since he was personally known to the great majority of the older members and greatly beloved. He was facile princeps among the early medical pioneers in this western country. The greater part of his professional life was spent at Banff, Alberta, where, in 1886, he founded the Brett Sanitarium which still continues as a very active institution.

Dr. Robert George Brett was born at Strathroy, Ontario, on the 16th of November, 1851, the son of James and Catherine Mallon Brett. He received his early education at the Strathroy Grammar School. He graduated in medicine from the Victoria College at Cobourg, Ontario, in 1874, and began his professional career at Arkona, Ontario, in the same year practising there until 1879. He found time during this period to take post-graduate work in New York and Philadelphia. In the year 1880, Dr. Brett came west to Manitoba, and not long afterwards became associated with others in the founding of the Manitoba Medical College and Manitoba University. In this institution he was Professor of Materia Medica and Therapeutics and later on Professor of Gynaecology and Obstetrics.

In 1886 Dr. Brett settled in Banff, not long after the first transcontinental railway had been built. He early recognized the great possibilities of this beauty spot, not only as a pleasure resort but as a health resort as well. The hot sulphur springs, moreover, had even at this time enjoyed a fairly wide repute for their healing properties. He utilized these waters in his newly built sanitarium. The name of Dr. Brett will long be associated with Banff. In 1894 he pursued post-graduate studies in Vienna. He served as a member of the Council of the College of Physicians and Surgeons from 1889 until 1906, when the Province of Alberta came into existence. He was president of this council in 1891 and 1897. He was also a member

of the same body in the Province of Alberta between 1906 and 1915 and president in 1906 and 1907. He later served as a member of the Dominion Medical Council.

Dr. Brett was elected in 1888 to the first Legislative Assembly of the Northwest Territories, and held his seat in this body until 1901. He was president of the Executive Council of the Northwest Territories from 1889 until 1891. He was president of the Alberta Conservative Association in 1909. He was appointed to the Senate of the University of Alberta in 1908 and in 1912. He was appointed Lieutenant-Governor of the Province of Alberta in 1915, and held this office with conspicuous ability until 1925. During the

war he was greatly interested in Red Cross work and became president of this institution in this province. For a time he was Chief Scout for the province. It is said that his contact with the Boy Scout movement was one of great interest, and that he almost invariably attended each meeting of the provincial branch.

Dr. Brett was married in 1878 to Louise T. Hungerford. Two sons, Harry and Earl, both died a few years ago. The former, Dr. Harry Brett, practised in Banff for many years, and was a prominent member of our profession.

The Hon. Dr. R. G. Brett was buried at Banff, following a service held in the Anglican Church, which was attended by a large and representative gathering. In this connection it may be mentioned that some years ago, Dr. Brett donated to this church a splendid set of chimes which will serve to perpetuate his memory.

The sympathy of the medical profession in Alberta is extended to his widow.

G. E. LEARMONT

AN APPRECIATION

The life of Hon. Dr. Robert George Brett in its effects upon the life of a community

was larger than that merely of an individual. Dr. Brett was almost an institution in Western Canada. Not that he lacked personality, for he fairly bubbled with it, but that the work he undertook and the influence he possessed was such as to affect materially the sanitary and health legislation of a considerable portion of Canada.

First, however, to speak of him as an individual. He was a man of strong opinions and of strong political sympathies, even prejudices, but he never allowed his opinions or his prejudices to interfere with his personal friendships. It is told that when he and Hon. Arthur Sifton were campaigning against one another, Dr. Brett did not turn up at a joint meeting on time. After waiting a little while, Mr. Sifton told the audience that he knew exactly what Dr. Brett would say and that he would deliver Dr. Brett's speech for him, which he proceeded to do. While Mr. Sifton was making his Conservative speech, Dr. Brett came into the back of the hall and applauded him vigorously, saying that Mr. Sifton could explain Conservative politics better than he could himself.

Another notable feature of Dr. Brett's character was his entire absence of false dignity. During his



HON. DR. R. G. BRETT

many years in the country he had served many people as a physician and had done very many kindnesses to old timers. On one occasion, when he was Lieutenant-Governor, he made a trip into the north, and word went through the country that the Lieutenant-Governor was coming on a visit. A well-known trapper near Ft. Vermilion tramped to the railway to see the wonderful person, and, when the Lieutenant-Governor appeared, all the old man could say was "Why, it's only old Doc Brett". Nobody enjoyed the joke better than Dr. Brett himself.

To the day of his death, Dr. Brett maintained the full warmth of his relations with the old timers of the west. Only a day or two before he went to the hospital for the last time, the writer met him on a Calgary street corner holding animated converse with two elderly gentlemen concerning the early days of the country.

Then there was the other side of his life, that which raised him almost to the status of an institution. Dr. Brett was in every sense a pioneer of higher medicine in the middle west of Canada. Almost as early as 1880 he helped to found the Manitoba Medical College and in it he held several professional positions. He was prominent in the organization of the University of Manitoba and to these various positions he brought the influence of a thorough education and a cultured mind.

His great work, however, was done in Banff, Alta., for it was there that he established in 1886 the Sanitarium which still bears his name, and gave to the world the benefit of the sulphur springs that have since become so famous. It might almost be said that when one thought of Brett, one thought of Banff, and that one could hardly think of Banff without thinking of Brett. His work on behalf of medicine was not, however, confined to his own individual enterprise. He was a member of the first legislative assembly of the North West Territory, and sat in that body for more than twelve years. The framing of the health legislation which forms the basis of the laws of to-day was largely in his hands, and the work was well done. He was President of the College of Physicians and Surgeons of the North West Territories and in more recent years he held the same position in the Dominion Medical Council. During the late war he occupied the presidency of the Red Cross Society of Alberta, relinquishing it only upon his appointment as Lieutenant-Governor. He was Chief Scout of the province and few meetings of the provincial branch of the Boy Scouts were held without his participation.

This is only a sketch of him, but such as it is it indicates a full life and a fine character. The influence of Dr. Brett in the country where he lived and worked will go on for many years. He has left memories of useful public service, and even fuller memories of a kindly and beautiful private life.

J. H. WOODS, Editor of the *Calgary Herald*

The Premier of Alberta, the Honourable J. E. Brownlee, pays this feeling tribute to the former Lieutenant-Governor:

"It is with the keenest regret that I learned this morning of the death of Dr. Brett. Since entering public life in 1921 I have enjoyed a close personal association with the doctor, especially during his second term of lieutenant-governor of the province, and, as I believe was the experience of all others who knew him intimately, my contact with his many delightful qualities of mind and of heart developed into a deep personal affection. He had in large measure all the personal qualities that command success in his chosen profession.

"His charming personality surrounded him with many close friends and endeared him to the general public. He gave unselfishly of himself and of his substance in the service of the province, and in his death Alberta loses another of its fine public-spirited pioneers who contributed so greatly to make it what it is to-day. The bells which he installed in the little church at

Banff, chiming in the mountains the simple hymns he loved so well, will long keep fresh among his fellow citizens the memory of a fine, kindly, lovable personality."

Dr. Walter David Byers. Dr. W. D. Byers, of Annapolis, N.S., died on September 8, 1929. Some five years ago Dr. Byers had a very severe automobile accident from which he suffered greatly and had been quite badly crippled ever since. On this account, too, he had not taken an active part in medical affairs as had been his custom.

Dr. Byers came from one of the oldest families in Colchester County, at a time when those sons and daughters looking towards one of the professions, theology, law or medicine, started with teaching school. Born in New Annan, some sixty-three years ago, while yet a young man he taught in the high school of Tatamagouche, in which place at that time the late Dr. Roach was regarded as the greatest of all the old stalwarts, at least in the minds of his many patients. After teaching several years, he entered Dalhousie University, graduating in Medicine in 1893. He practised first in Nova Scotia and then for a few years in Reading, Mass., coming to Annapolis in 1902. He also spent several years in Alberta where he acquired considerable property. For five of the seven years he had been in Annapolis, he had been more or less an invalid.

Dr. Byers is survived by his wife; one son, Winthrop, in Chicago; and one daughter, Mrs. Townsend, also in Chicago. Mrs. Byers was formerly Miss Etta Peppard, daughter of the late Dr. J. L. Peppard, of Great Village, Colchester County, a leading physician and politician.

Dr. James Dalton. The death of Dr. James Dalton is reported recently from Woodstock, N.B. Dr. Dalton has practised for some years at various places in New Brunswick and was at one time treasurer of the New Brunswick Medical Association.

Dr. L. T. Davis died at his home in Parksville, V.I., on the morning of September 23rd.

The late Dr. Davis was sixty-seven years of age. He graduated in Medicine at Queen's University in 1883, and was the first physician of Nanaimo Hospital, later practising in Victoria. He leaves his wife, one daughter, and three sons.

Dr. George Henderson died suddenly on October 7, 1929, at his home in Souris, Man., where he had practised for twenty-one years. He was born in Banffshire, Scotland, in 1866, received the degree of M.A. from the University of Aberdeen, and of M.D. in 1896 from Manitoba Medical College. For two years he practised in Cavalier, N.D., and then settled in Souris, where he had an extensive practice. He was district coroner, and at the time of his death was Medical Health Officer for the town of Souris and the municipality of Glenwood. He served as school trustee for years and was a Past-Master of Glenwood Lodge No. 27 A.F. & A.M.

He commanded a company of infantry in the 99th Manitoba Rangers, now the 45th Battalion, and at the time of his death was President of the Western Manitoba Medical Society.

In 1898 he was married to Mary Nichol, of Wawanesa, who survives him, together with a son and daughter.

Dr. Robert Edward Holbrook, of Brandon, passed away in his sleep at the age of 49, after a short illness due to myocarditis, on the morning of September 11, 1929. He had spent a few days in hospital six weeks before, but was usually able to go about his

work, though often consulting his confrères about his condition.

He was a Manitoban; graduated from McGill University in 1907, and practised in Ninga and Vancouver before coming to Brandon, where he spent fifteen years. He had also spent two short periods on the Hudson Bay Railway beyond The Pas.

His wife predeceased him during the influenza epidemic of 1918. A daughter, Ruth, aged 17, and a son, Wilbur, aged 13, survive.

JEREMIAH S. CLARK

Dr. W. J. Robinson, Superintendent of the Ontario Hospital for the Insane, died suddenly in his office on September 3rd, from a heart attack. He was chatting with officials when he fell over, dying within a few seconds.

Dr. Robinson was born in the Township of Mc-Gillivray, Middlesex County, on July 24, 1858, and was a son of Robert and Jane Pritchard Robinson. He began his education in the public schools, and graduated from the Fergus High School and the University of Toronto. He obtained his degree in medicine in 1883, and began practising in the village of Arthur, Wellington County. He continued there until 1893, when he removed to Guelph, where he practised until he was appointed head of the Hospital for the Insane, London, Ont., in 1908. He is survived by his widow and three daughters, Mrs. Gerald Pearson of Toronto, Mrs. Eton Howitt of Guelph, and Miss Ruth, at home.

Dr. Thomas Patton Shaw died at his home, 2250 Dorchester Street West, Westmount, Que., in his 58th year. He had been attending to his practice until the day before, although his health had not been good for some time previously. Dr. Shaw was prominent in the affairs of the Western General Hospital, where he started the children's ward. His practice in Montreal covered a period of thirty-six years.

A son of the late Thomas Shaw, Dr. Shaw was born in Montreal, attended the Montreal High School and later McGill University, where he took his medical degree in 1893. He also took a post-graduate course in London, England. Dr. Shaw was Demonstrator of Physiology at McGill University from 1906 to 1909 and was promoted to Lecturer in 1910, which post he held for five years. He was medical officer of the Julius Richardson Home at Chateauguay and took a great interest in the work there. He was also a life member of the M.A.A.A., the Heather Country Club, the Lake Country Club and a member of the University Club.

Dr. Shaw is survived by his wife; his son, Gladstone, of Shawinigan Falls; his daughter, Miss Margaret Shaw; and his brother, Dr. James M. Shaw.

Dr. Prosper Synnott of Les Eboulements, died at the age of 66 years. After Dr. Synnott graduated from Laval University, he took up his practice in Les Eboulements, where he was for forty years.

GEORGE HALL

News Items

GREAT BRITAIN

Hospital Extensions

Magnificent as is the hospital system of London, it is constantly proving insufficient to meet the increasing demands upon it. So rebuilding and extension schemes become necessary, and courts of governors anxiously devote themselves to the necessary task of appealing anew to a generous public for the money with which to meet their increased liabilities. At St. Thomas's Hospital the possibility of erecting an out-patient department on the site purchased in 1919 opposite the hospital has been discussed for some years past. Now the scheme has been evolved, which, if it can be carried out, will make St. Thomas's the finest hospital in Europe, with the most up-to-date methods of treatment in all branches of the out-patient department. Plans accordingly are being prepared, both for the new out-patient department and for the new medical school on the other side of the road. At St. Bartholomew's Hospital the erection of the surgical ward block and operation theatres is making good progress, and the buildings should be ready for occupation by the beginning of next year. These buildings form part of the complete scheme of the reconstruction of the hospital. The completion of the recreation rooms and lecture rooms for the nurses marks a further step forward in the building of Queen Mary's Home for St. Bartholomew's nurses. The governors have approved of an extension of the home—which will provide accommodation for 51 additional nurses, at an estimated cost of £51,050.

Portions of the work, including improvements and additions to the hospital itself and the medical school, have been completed and paid for. The surgical block which will provide 250 beds, five operating theatres, and an annex for the 50 sisters on the hospital staff, will cost,

it is estimated, £231,000, of which £98,000 has been received, leaving £133,000 to be provided. Into a third section, which has not yet been begun, and for which all the money has to be found, comes the reorganization of buildings erected two centuries ago and the provision of an in-patients' department for children, who now have to be placed in the wards for adults. These buildings soon to be completed represent a large hospital in themselves. The 250 new beds will do much to remove the necessity which frequently arises for refusing admission to the hospital because of lack of accommodation. The new operating theatres and wards will also put an end to the need for wheeling patients across the quadrangle courtyard, in all weathers, to and from the present operating theatres. The work of reconstruction has been, and is to be carried out with as little demolition and rebuilding as possible. The historic Henry VIII gate will be preserved as the chief entrance, and the great hall, with its portraits, and the staircase, with the Hogarth paintings, will remain undisturbed. There is no room within the walls for a residential college, but it is hoped to secure an adjoining site.

The Canadian President-Elect at the Manchester Meeting of the British Medical Association

The President, in formally reporting that the Representative Body had elected Dr. W. Harvey Smith, Professor of Ophthalmology, Manitoba Medical College, as President of the Association for the year 1930-31, said: "Occasionally the British Medical Association holds its Annual Meeting outside our own country. We have met at Montreal, and our last meeting abroad was at Toronto in 1907. It has been decided that our next shall be at Winnipeg in 1930, and Professor Harvey Smith will be President. It would be invidious

for me to speak of his abilities as an ophthalmologist, and so on. I have known of him for long, but it is only in the past two or three days that I have enjoyed the pleasure of his personal acquaintance. He has shown that he is one of the best of good fellows, and I am sure he will be in every way as successful as his predecessors have been. And I may say that in the short time that Mrs. Harvey Smith has been in this city we have all been impressed by her manifold charms and graces. She has gained the golden opinion of all those with whom she has come into contact. I am sure that in the hands of Professor and Mrs. Harvey Smith the meeting at Winnipeg will be a tremendous success, and that all those who may have the good fortune to go will have the time of their lives."

Professor Harvey Smith, who was very cordially received, said: "Mr. President, ladies, and gentlemen, I thank you from the bottom of my heart for your kind words. And I thank the Association for their kindness in appointing me to this great office to carry on the affairs at Winnipeg next year. Though I have been connected with many American enterprises, nothing I have ever undertaken has given me greater pleasure, or provided me with a greater interest, than the work which now lies before me. In this connection I acknowledge, with very great thanks, our indebtedness to the officers of the Association, especially to my good friend Dr. Alfred Cox, who has been 'a lamp unto my feet and a light unto my path.' I have written him numberless letters, on all sorts of topics, and he has been patience personified; he has never failed me. The first invitation which was extended for the Association to meet in Winnipeg was thirty-three years ago, which seems a long time to wait, but ultimately this great reward has come to us. Need I say how welcome you will be in every portion of Canada?"

It is more than a scientific meeting; it is a gathering together of brethren of the British Empire. Thank you again for your kindness." (Applause.)—*Brit. M. J.*

Revision of the Pharmacopœia

The Pharmacopœia Commission established by the Council at the instance of the Pharmacopœia Committee has been diligently at work under the able chairmanship of Dr. A. P. Beddard. Considerable progress has been made with the work of revision and satisfactory relations formed with the authorities in the several overseas Dominions. The Committee has also appointed Mr. Charles Herbert Hampshire, M.B., Ph.C., to be Secretary to the Commission. Not only is Mr. Hampshire doubly qualified in medicine and pharmacy but he also has a wide acquaintance with pharmacopœial literature and research which will enable him to render specially valuable service to the Committee.

Radium Research

At the London Hospital the new radium department is now in working order. The recent gifts of a gram of radium each from two anonymous donors, together with a sum of £13,000 in addition from one of the donors for the endowment of the department, have placed the hospital in an exceptional position as a centre for treatment by radium, and for research into treatment by that method. One gram of radium has been delivered and is being used for the making of radon, primarily for the use of the hospital patients. As more radon can be made than the institution actually requires, arrangements have been made for supplying it, at a charge, to other hospitals and to members of the staff for private cases.

NOVA SCOTIA

The report on the vital statistics of Canada for the year 1926 shows that ninety-one centenarians died during that year. Of these, sixteen were residents of Nova Scotia. With less than 6 per cent of the population of the Dominion, the Blue nose province contrived to supply nearly 18 per cent of the centenarian deaths.

A rumour that Dr. F. R. Little, of Halifax, had been killed in a motor accident, had recently widely circulated and naturally greatly shocked the genial doctor's many friends. Fortunately he was able to produce convincing evidence that the rumour was unfounded but it is said that several persons who telephoned his house to express sympathy received a second shock when the telephone was answered by his familiar voice, which quite lacked any ghostly quality. His experience was perhaps rather less disturbing than that of Dr. Murdoch Chisholm, who, on the day of the Halifax disaster of 1917, had the peculiar privilege of reading in an evening paper of the universal regret that he should have been among those who lost their lives on that memorable occasion. Perhaps the most amusing feature of Dr. Little's experience was the incredulity of some who seemed unable to fully accept his declaration that he still lived comfortably and happily.

Following the capture of Louisburg by New England forces under Pepperell, in 1745, the French at once set about preparations for the recapture of their lost stronghold. A mighty naval and military force was

mustered and placed under the command of the Duke d'Anville. Storm after storm delayed and scattered the fleet, and when d'Anville at last reached the chosen rendezvous, now Halifax harbour, his ship had but a solitary consort and he found only one ship awaiting him. Others straggled in from time to time, but the expedition was doomed to misfortune. The commander died of apoplexy, and an infectious disease (some think it was typhus, others that it was smallpox) worked havoc with sailors and soldiers. It is said that fully 2,500 perished and were buried along the shores of what is now known as Bedford Basin. On the fourth of September of this year, a cairn was dedicated to their memory. This was erected by the Nova Scotia branch of the Canadian Historical Sites and Monuments Commission, and dedicated with fitting ceremony. France sent a new war ship to participate in the event, and England and Canada were represented by H.M.S. Despatch and H.M.C.S. Stadacona. The ceremony recalls one of the most melancholy incidents in the early history of Canada, and reminds us of the frequency and fatality of epidemics in those days.

Dr. Jaynes and Macfarlane, of Toronto, were recently in Nova Scotia, lecturing under the auspices of the Canadian Medical Association. They addressed meetings of the Cape Breton and Eastern Counties branches of the Medical Society of Nova Scotia. In October, a team, composed of Dr. J. R. Goodall, of Montreal, and Drs. S. R. Johnston and S. L. Walker, of Halifax, addressed branches of the Society at Amherst, New Glasgow, Truro, Bridgewater, and Kentville.

Twelve members of the nursing staff of the St. Martha's Hospital, Antigonish, were awarded diplomas at graduation exercises which were held on September 24th.

Drs. A. M. Marshall and R. A. H. MacKeen, of Halifax, have been appointed to the staff of the Dalhousie Clinic.

W. H. HATTIE

NEW BRUNSWICK

A largely attended meeting at Chatham, on September 15th, considered ways and means for the better combating of tuberculosis on the North Shore. The feeling of the meeting was that a tuberculosis sanatorium was necessary in this part of the province. Dr. Collins, of Riverglade, and Dr. Melanson, Tuberculosis Consultant for the North Shore, at this meeting met the physicians of the Hôtel Dieu Hospital, Chatham, and the Miramichi Hospital, Newcastle.

Under the auspices of the Provincial Department of Health additional clinics for immunization against diphtheria have been established, notably at Gagetown and Jemseg. The response to the desire of the Department has been most gratifying.

It is hoped that the new Nesbit wing to the Saint John County Hospital will be ready for the official opening early in November. Good progress has been made by the contractors, and the necessary additional corridors have been constructed to link the new wing with the main building. At the same time considerable additions have been made to the nurses' home, and several new sleeping galleries have been added to the older building.

Dr. W. E. Rowley, of Saint John, has been confined to his home for a month suffering from septic sore throat.

A severe form of nose and throat infection has lately been prevalent in the province. The symptoms of cold in the head, with much bronchitis, has been complicated by gastro-intestinal upsets, among which diarrhoea is a distressing symptom. This epidemic is also characterized by a rather severe depression and occasionally by prostration.

Dr. W. W. White, Mayor of Saint John, and Dr. A. S. Kirkland, General Public Hospital, Saint John,

were the medical speakers at the annual meeting of the New Brunswick Society of Registered Nurses.

The New Brunswick delegation to the forthcoming meeting of the American College of Surgeons will include Drs. A. E. Macaulay, V. D. Davidson, D. C. Malcolm and G. A. B. Addy, of Saint John.

Dr. John T. Lewis, Hillsboro, died suddenly on October 2nd.

Dr. B. F. Johnson who has practised for many years in West St. John has left for California.

Dr. H. L. Abramson, Provincial Pathologist, was a Crown witness at the circuit court at Chatham this week.

Brigadier-General George Acheson, M.D., has been forced to discontinue his practice at St. Martin's owing to ill health. Dr. Acheson has been a patient at the Infirmary, Saint John, for some weeks and is leaving shortly for Ontario.

Dr. C. G. Main, of West St. John, is slowly recovering from a serious illness complicated by phlebitis. Dr. Main is at present convalescing in the north of the province.

Dr. W. O. McDonald and Dr. D. W. Buchanan have been gazetted as provisional lieutenants of No. 1 General Hospital, C.A.M.C.

Dr. H. B. Bustin has been promoted to a captaincy in No. 14 Field Ambulance.

Dr. George Antoine Cloutier, of St. Leonard's has been gazetted as a provisional lieutenant, C.A.M.C.
A. STANLEY KIRKLAND

QUEBEC

The City of Montreal has finally adopted a by-law creating a Board of Health for the city. The history of the movement which has led to this decision is too long to be told here. It will be enough to recall that it was due to the disinterested and unflagging efforts of a group of Montreal citizens that money was found to make a thorough survey of the health conditions in the city, out of which survey came the suggestion that this Board of Health be created. The whole movement is one that reflects the greatest credit on the energy and broadmindedness of those responsible for its initiation and successful prosecution.

The Board is to consist of nine members, two of whom will be appointed by McGill University and two by the University of Montreal. The other five will be appointed by the city and will include three aldermen, the director of the Health Department and the chairman of the city executive. It had been suggested that representatives should be sent from the Board of Trade and the Chamber de Commerce, but this proposal was finally dropped.

The Board will be an advising body only: it is to advise the civic authorities on any matters pertaining to hygiene and submit to the Executive Committee such recommendations, or suggestions as it may deem advisable to make on any question relating to public health which it shall have considered, either at the request of the said Committee or on its own initiative.

"The members of the said Board of Health shall remain in office until their successors have been appointed and shall be entitled to an honorarium of \$..... whenever they attend a meeting of the said Board."

Specially bound copies of Sir William Osler's booklet, "A way of life" were presented to second year students of the Faculty of Medicine of McGill University. Dr. W. W. Chipman, Professor of Obstetrics and Gynaecology, gave a short memorial address on the life of the late Dr. W. Grant Stewart, who instituted the annual presentation of Osler's booklet, which has since been carried on by Mrs. Stewart. Dr.

Charles F. Martin, dean of the faculty of medicine presided.

Dr. Henri A. Lafleur, of McGill, received the degree of Doctor of Letters, *honoris causa*, at a special convocation held at Queen's University on October 11th.

Dr. Georges Mauriquand of the faculty of science of Lyons, is now giving lectures in Montreal until November 4th, in the amphitheatre of the faculty of medicine, University of Montreal, under the auspices of the Institut Franco-Canadien. The visitor will speak on "The sick child."

An annex, estimated to cost \$150,000, will be added to the civic hospital of Quebec, it was decided by the administrative committee of the City Hall.

The entire community will join in hearty congratulations to the Jewish population upon their notable achievement in collecting \$1,570,139 for a new hospital in Montreal. This was far in excess of the million dollar objective and especially of the \$600,000 objective first modestly suggested. Those responsible for promoting this worthy object will thus have the sum of \$1,570,139 with which to build and endow a new house of healing in Canada's metropolis. The need for this has long been apparent. No city of its size on the continent is more badly under-hospitalized. The building it is proposed to erect should go a long way towards meeting the present need, since it will not be confined to Jewry alone, but will be open to all races and creeds. It will stand for the latest skill that science has made available and it will serve to relieve the tremendous pressure that has weighed for far too long upon the hospitals already in existence here. The fact that the Jewish people made no direct appeal to citizens outside their own religion only serves to emphasize the magnitude of the triumph their efforts have won. While many contributions to the fund came from outside of their own race, these were tributes in recognition of the merits of their drive, and made clear beyond doubt that they enjoyed the sympathetic support of the whole body of citizens.

The new addition to the Immigration Hospital at Savard Park was formally opened by Dr. Henri Laurin, in the presence of officials of the Federal Department of Health, and railway and steamship officials. There are 180 beds in the new wing, which is fireproof and equipped with modern appliances.

There are now 27 doctors and 80 nurses attached to the child hygiene section of the city's department of health, according to a report published by Dr. S. Boucher. At the beginning of the current year there were but 20 doctors, many on part time, and 50 nurses. There are now 25 doctors acting on full time and 70 nurses on full time duty to this department of work. The child hygiene section deals with school inspections, baby clinics, the prevention of infant mortality, pre-

venting contagion among children, helping mothers to take care of their little ones, supervision of children's boarding houses, and carries on a program of prenatal and pre-school age medical and hygiene work.

With the exceptionally high infantile mortality rate of 588.2, comprising 10 deaths of children under one year, as against a total number of births of 17 during the month, Chicoutimi headed the list in the Province of Quebec for the month of June, according to vital statistics issued. Rimouski, with a rate of 250, which comprised 5 deaths out of a total of 20 births, was second; and Shawinigan, with a rate of 197.6, comprising 12 deaths out of a total of 61 births, was third. Hull led the province for July in the same category, with a rate of 236.1, there being 17 children dead out of a total number of births of 72, while LaTugue was second, and Rimouski third. The provincial birth-rate for June was 29.9 per thousand, slightly higher than that of the following month when it dropped to 28.7, but the June infantile mortality rate of 100.1 per thousand, was above that of July, when the figures recorded were 93.2.

The Premier, after a visit from the Minister of Agriculture, accompanied by a delegation headed by Prof. J. E. Dube, M.D., of the Hotel Dieu; Dr. J. A. Jarry, chief medical officer of the Bruchesi Institute; J. B. Baillargeon, well-known business man, stated that the government was as ready as ever to assist in the anti-tuberculosis campaign. Nine hundred more beds are necessary to face the ever-growing needs, it was pointed out by the delegation. A city hospital of 400 beds to care for those in the early stages of the disease would be of considerable assistance, while an addition of 500 new beds to Camp David for juveniles is said to be of primary importance. Mr. Taschereau told the delegation that he was quite ready to co-operate to the limit in the fight against tuberculosis, and he invited the delegates to ask the population of Montreal to make up for a generous subscription in order that the \$100,000 to be possibly subscribed by the government might not be taken as the end and limit of possible assistance.

Dr. A. G. Murphy announces that Lovat Hall, a private hospital for nervous and mild mental cases, will be ready to receive patients about the end of December.

Lovat Hall is situated two miles east of Lancaster, Ontario, on a very fine estate of fifty acres, bordering on Lake St. Francis, one of the most beautiful parts of the St. Lawrence River. Further particulars will be given in the December number of this *Journal*.

Dr. B. Alexander, formerly of the Montreal General Hospital, has been appointed chief medical officer of the Royal Eye Hospital, Manchester, England.

Dr. L. P. Ereaux and Mrs. Ereaux have returned to Montreal from Vienna, where the former has been pursuing post-graduate studies. GEORGE HALL

ONTARIO

On September 10th, at a meeting of the Hastings and Prince Edward Counties Medical Society, held at Stirling, Dr. A. B. LeMesurier, of Toronto, gave an address on "Acute abdominal conditions of childhood."

The Grey County Medical Society met at Owen Sound on September 18th, when the following addresses were given: Dr. F. W. Rolph, Toronto, "The interpretation of the signs and symptoms of chronic gastro-

intestinal disease;" Dr. W. E. Ogden, Toronto, "Early diagnosis of pulmonary tuberculosis in adults."

At a meeting of the Lambton County Medical Society held at Petrolia, on September 25th, Dr. C. H. Hair, of Toronto, gave a talk on "Surgical diagnosis in the genito-urinary system."

The Bruce County Medical Society met at Walkerton on September 26th, when the following addresses

were given: Dr. D. E. Robertson, Toronto, "Fractures;" Dr. R. I. Harris, Toronto, "Kidney lesions in children."

Dr. A. H. W. Caulfeild, of Toronto, addressed a meeting of the Brant County Medical Society at Brantford on the evening of September 26th, his subject being "Chronic non-tuberculous pulmonary diseases."

At a meeting of the Sault Ste. Marie Medical Society held on September 27th, Dr. Geo. A. Campbell, of Ottawa, gave a talk on "Difficult cases in paediatrics."

The St. Thomas Medical Society met on the evening of September 27th, when Dr. D'Arcy Frawley, of Toronto, gave a talk on "Fever in the puerperium."

N. B. GWYN

MANITOBA

The Manitoba Sanatorium Board has acquired a substantial brick building at the corner of Bannatyne Avenue and Olivia Street, which will be converted into a tuberculosis clinic. A tunnel under Olivia Street will connect it with the Winnipeg General Hospital, from which heat and power will be supplied. The proximity of the building just acquired to the General Hospital and the Medical School will be a great asset.

In the absence of Premier Bracken in England it is expected that no decision of the University Site Committee will be reached before December.

The death on October 8th of Lady Schultz removed one of the few remaining links of the present with the troublous days of Fort Garry. In 1864 she came to the settlement at the junction of the Red and Assiniboine rivers where there were only twenty-seven houses. Soon afterward she married Dr. John Christian Schultz. In 1870, when her husband was imprisoned in Fort Garry, she accompanied him to prison and was successful in smuggling in to him a gimlet and pen-knife with which he managed to make his escape. After the Riel rebellion was put down Dr. Schultz

was M.P. for Lisgar, later Senator, and still later, Lieutenant-Governor of Manitoba for four years. It was during this period that he was knighted. In his later years Sir John suffered from ill health, the result of his extraordinary efforts during the rebellion, and Lady Schultz was a devoted nurse up to the time of his death. To "Women of the Red River," edited by Mr. W. J. Healy, Lady Schultz contributed reminiscences, but it is to be hoped that she has left material for memoirs of a critical period in Manitoba's history in which her distinguished husband played a stirring part.

At the meeting of the Scientific Club of Winnipeg, on October 15th, Dr. William Boyd presented a communication "Recent work on neuroglia and glial tumours."

Dr. C. A. Mackenzie, President of the Manitoba Medical Association, Dr. W. Harvey Smith, President-Elect of the British Medical Society, and Dr. J. E. Lehmann, all of Winnipeg, took part in the program.
ROSS MITCHELL

ALBERTA

The annual meeting of the College of Physicians and Surgeons of Alberta was held following one of the sessions of the Alberta Medical Association meeting. One of the questions of interest was the relationship of the medical profession to the school boards of the rural districts. The Council went on record on behalf of the profession that it would co-operate with all rural school districts in order to inaugurate a system of health inspection for rural school children throughout the province, equal to that so well rendered in the various schools in the different cities of Alberta. As legislation already provides for this type of school service, school boards need not await any further legal amendments, but may proceed at once to avail themselves of this service if they so desire.

Regarding the question of British reciprocity most of the provinces of Canada no longer accept certificates of British registration as passports to provincial registration. Alberta still retains this reciprocity and the Council decided to take no steps to alter the arrangement.

Undoubtedly we shall always have indigents with us, but the exact interpretation of what the term "indigent" means is open to doubt. The Act specifies one meaning, whilst a rural councillor states that the words "indigent" and "pauper" are synonymous. Recently, a councillor in one of the rural districts declared that "an indigent was a person who could not provide food and clothing for his

family." He therefore refused to assume payment for a hospital account because the man had a sack of meal and a blanket.

There has been much agitation in the City of Calgary concerning the present water supply, which derives its source from the Bow river, not far from Calgary, and from many points of view it is not at all satisfactory. A special meeting of the members of the Calgary Medical Society was held on September 24th to discuss the situation and the following resolution was adopted.

RESOLVED: that the members of the Calgary Medical Society strongly endorse the steps taken by the Mayor and Council of the City of Calgary to have a survey made by a competent engineer, who will report on the most feasible scheme to provide an adequate water supply for the City of Calgary.

That every means should be adopted to secure a supply of water free from contamination and pollution. If a site for a reservoir, and the right to construct it within the confines of the Dominion Forest Reserve, could be secured from the Dominion Government, and assurance be obtained from the government that the watershed draining into such reservoir would be perpetually held free from all industries, camp sites, and human habitations. That, if necessary, considerable sums of money should be expended to insure such freedom from contamination.

That as far as possible, and in the interests of safety, the water system should be so planned that

artificial means of purification would be rendered unnecessary and pollution from floods would be avoided.

Dr. J. B. Valentine, of Lougheed, has moved to Galahad, where there is a modern twenty-bed hospital under the administration of the Roman Catholic Sisters. There is also a hospital at Hardisty under the same management which is filling a long felt need for hospital accommodation. This latter hospital was only opened last February.

The hospital at Daysland is being enlarged, and will soon have accommodation for fifty patients. This will be of inestimable benefit to the surrounding district. This hospital was closed some time ago when the large hospital at Camrose was opened.

The extra-mural post-graduate tours arranged through the grant to the Canadian Medical Association with the Alberta Medical Association in co-operation, have become so increasingly interesting and popular that the towns of Wainwright and Viking are each urging claims to be included in the itinerary of lectures to be given in November.

Professor Alan C. Rankin, of the University of Alberta, gave a most instructive address to the members of the Calgary Medical Society on October 8th, on "Some of the infectious diseases of unknown origin" in which he dealt with those due to a filterable virus, including rabies, small-pox, acute anterior

poliomyelitis, Rocky Mountain spotted fever, yellow fever, trench fever, the Rous sarcoma of chickens and other like diseases. This address was a particularly interesting one.

The municipal hospital at Hanna has recently been enlarged so that it will accommodate more than twice the number of patients it did formerly. With the extensive additions, it is now a thoroughly modern up-to-date hospital, serving a large surrounding country district. This new addition was recently opened, when the Hon. George Hoadley, Minister of Health, and Dr. M. R. Bow Deputy-Minister of Health were present. This hospital was first opened in 1921 with accommodation for twenty-two patients; with the new addition there will be room for fifty-four patients.

Dr. T. W. Moore, of Mountain Park, has given up his contract with the coal-miners at this place, and Dr. A. C. Greenway, of Killam, has been appointed as his successor.

Dr. J. J. Dubay, of Gadsby, has taken over the practice of Dr. A. C. Greenway at Killam.

Dr. J. G. Middlemas, of Wainwright, and Dr. G. N. Mayres, of Galahad, have formed a partnership.

Dr. Rosedale, a recent graduate of Alberta University, is now an interne on the staff of the Henry Ford Hospital in Detroit.

G. E. LEARMONT

BRITISH COLUMBIA

Dr. E. L. Garner, of Duncan, left on September 19th on an extended trip to eastern centres. During Dr. Garner's absence Dr. Murray Baird, recently of the staff of the Vancouver General Hospital, is assisting Dr. G. D. Bissett.

Deep sympathy is being expressed for Dr. and Mrs. C. S. McKee, of Vancouver, whose son George lost his life on September 22nd while piloting an airplane over Lake Manitoba.

Dr. G. C. Paine is associated with Dr. R. B. White of Penticton, B.C.

Dr. R. G. Large, of Port Simpson, spent a holiday during the month of September, his practice being cared for by Dr. A. W. McCordick of Vancouver, B.C.

Dr. Gordon James, late of Vancouver, is now assistant to Dr. H. R. Learoyd, of Anyox, B.C.

Dr. A. P. Proctor, Jr., formerly of Penticton, is now associated with Dr. O. G. Ingham at Nanaimo, B.C.

Recent out of town visitors to Vancouver included Dr. D. W. Davis, of Kimberley; Dr. C. M. Willoughby, of Kamloops; Dr. A. K. Connolly, of Williams Lake; and Dr. J. F. Haszard, of Trail.

Dr. E. Seldom, of Vancouver, paid a visit to the east during September.

Dr. J. G. Robertson is joining Dr. J. G. Mackay as assistant.

Dr. Walter Graham has resigned his position at Sandon and intends to practise in Vancouver, B.C.

Dr. J. C. Grimson, of Ladner, is at present on a holiday, and Dr. R. B. Shaw is acting as his locum tenens.

Attention is drawn to recent amendments to the Coroner's Act of British Columbia. The fees for inquests and autopsies have been materially increased. These amendments are the result of representations made to the government by the British Columbia Medical Association.

C. H. BASTIN

UNITED STATES

Infant Mortality in the United States

A copy of the Statistical Report on Infant Mortality for 1928, issued by the American Child Health Association, contains much of importance. The following points may be noted.

1. The infant death rate is 68.3 for the 719 cities of the Birth Registration Area.
2. Last year's rate was 64.9 for 683 cities then in the area.
3. The 1928 rate is, next to the 1927 rate, the lowest ever achieved.

4. The baby death rate to-day is two-thirds what it was fifteen years ago.

5. "The United States is fast approaching the time when it may know its own birth and death rates." When a rate was quoted for the United States in 1915 it reflected only the figures from 10 states and the District of Columbia which then constituted the Birth Registration Area. In 1928, 44 states and the District are included. One more state was added in 1929, leaving but three states now with unacceptable records.

6. For the population group over 250,000, the cities with lowest rates were Seattle, Wash., and Portland, Ore., 43; San Francisco, 46.

7. Population group 100,000 to 250,000: lowest rates, Oakland, Cal., 47; Spokane, Wash., 49; Des Moines, Iowa, and Cambridge, Mass., 53.

8. Population group 50,000 to 100,000: lowest rates Berkeley, Cal., 31; Union City, N.J., 32; Long Beach, Cal., 38.

9. Population group 25,000 to 50,000: lowest rates Alameda, Cal., 25; Medford, Mass., 30; Oak Park, Ill., and Everett, Mass., 31.

10. Population group 10,000 to 25,000: lowest rates, Holland, Mich., 21; Braintree, Mass., 22; Stonington, Conn., 24.

11. The source of these records is the provisional reports of the United States Census Bureau and state and local authorities.

12. "Presence or absence of institutions, state of wealth, family customs characteristic of different race and nationality groups, knowledge and probably climate, each has an unquestioned part in determining the size of the infant mortality rate and these influences must be reckoned with as well as the thoroughness of the prenatal and infant welfare programs."

13. "As a metre of public health progress, contributed to from various channels, the infant mortality rate is most serviceable as an index of trend from year to year within the same city.

14. Among 10 large cities of the country New York has improved its relative standing of 3rd in 1916-1920, to 1st in 1925-1928. Philadelphia has advanced from 7th place to 5th place; Cleveland from 4th to 2nd. Boston has retired from 5th to 9th place, St. Louis from 2nd to 4th, and Los Angeles from 1st to 3rd.

15. "Wide acquaintance with the facts is believed to be one of the surest ways of accelerating a nationwide effort toward reducing the death rate among our babies."

The George David Stewart Endowment for Surgery

The University of New York announces the receipt of \$1,000,000 from George F. Baker, New York City, for the establishment of a fund to be known as the George David Stewart Endowment for surgery. The profession in Nova Scotia will be delighted to learn that this young school teacher from Malagash has received such a splendid recognition of his forty years' career in surgery in New York City. A striking feature of the incident is its illustration of the personal confidence and friendship, with ideals of life based on sound character, of the chief heads in the fields of medicine and finance. George Baker, the financier, and George Stewart, the surgeon, are two men we do well to honour.

William Crawford Gorgas

October 3rd commemorated the 75th anniversary of the birthday of one of the great chevaliers of medical science—William Crawford Gorgas, physician, sanitarian, and army officer, who freed Havana and the Panama Canal Zone of yellow fever.

The Gorgas Memorial Institute, with headquarters at 1331 G Street, N.W., Washington, D.C., founded to honour the name and achievements of Dr. Gorgas, announces that during the past year the two-fold purpose of Gorgas, Health Education and Research, has been carried forward in an active program which has benefited directly and indirectly the profession of which he was a member.

The program of Health Education has been accomplished through several mediums: the press, the speaking platform, the radio and through high school essay contests. Many physicians have aided in the per-

formance of this great task. Some have written health stories in terms of lay English, which have been released through the regular publicity channels of the Institute; some have assisted the Speakers' Bureau of the Gorgas Headquarters in arranging opportunities for the caravan health speakers; some have written medical articles for radio release, and a few have been of material assistance in bringing the high school essay contest, conducted during the past year, to the attention of the schools of their respective cities.

Health Corps have been organized in 72 cities, 40 newspapers have been added to the Gorgas syndicate, 3,830 health posters stressing the importance of the periodic health examination have been distributed and displayed, 5 special radio talks have been made in addition to the regular weekly radio health talk which is made over 22 of the leading stations of the country, and a special health film has received 55 showings to an estimated total audience of 29,243. A field program of this size has been made possible largely through the generous financial contribution of the Metropolitan Life Insurance Company.

The research work of the Memorial has been given an added impetus through the gift by the Government of Panama of a beautiful edifice which houses the laboratory in Panama. The 70th Congress of the United States made an annual appropriation of \$50,000 for the maintenance of this laboratory and Latin-American countries will contribute a *pro rata* share on the basis of population to the support of this project. Dr. Herbert C. Clark, a noted scientist, formerly of the United Fruit Company, assumed his duties as Director of the laboratory on January 1st. A Consulting Board from each Latin-American country operating will be appointed by the respective governments to aid Dr. Clark in his work. The Gorgas Memorial Laboratory will point the way toward better personal health from the place where the one whom it honours performed a miracle of science by making practical application of the Walter Reed theory of the transmission of yellow fever. The nations represented in the enterprise are banded together as brothers to make war on the scourges of disease. While they do not always see eye to eye on questions of international politics, in the name of Gorgas they are in this undertaking as an agency of welfare, and therefore an agency of greater efficiency and happiness for the human race.

President Hoover is the Honorary President of the Institute and Vice-President Charles Curtis is a member of its Board. At the last annual meeting held in Boston, Rear-Admiral Cary T. Grayson, "Physician to Presidents," was elected the active President of the Institute and Dr. Franklin Martin, President of the American College of Surgeons, was elected Chairman of the Board. Dr. Bowman C. Crowell of Chicago was appointed Chairman of the Scientific Board which will direct the policies of the Laboratory. Outstanding physicians, dentists, scientists and statesmen comprise the board, and an Advisory Council is composed of members of the Diplomatic Corps of the various Latin-American countries.

The great work of this organization will be carried on with renewed effort during the coming year. It is the duty and privilege of the medical and dental professions to co-operate, not only because of the ultimate benefit to these professions themselves, but because of the crying need of a campaign of this sort for the better personal health of our people everywhere. In this way can the deeds of a great man live after him, his most fitting monument.

The Committee on the Cost of Medical Care

In the United States, in 1928, a committee was organized to study the economic aspects of the care

and prevention of disease. The officers are: Ray Lyman Wilbur, M.D., Chairman, Stanford University, California. C.-E. A. Winslow, Dr. P.H., Vice-Chairman, Yale University School of Medicine, New Haven, Connecticut. Chellis A. Austin, Treasurer, Seaboard National Bank, Broad and Beaver Streets, New York City. Harry H. Moore, Ph.D., Director of Study, 910 Seventeenth Street, Washington, D.C., assisted by an executive committee composed of C.-E. A. Winslow, Dr. P.H., Chairman; Walter P. Bowers, M.D.; Michael M. Davis, Ph.D.; Mrs. Wm. Kinnicutt Draper; Haven Emerson, M.D.; George E. Follansbee, M.D.; Walton H. Hamilton, Ph.D.; Walter R. Steiner, M.D.

There are some forty other members, representing various interests, such as, Private Practice, Public Health, Institutions and Special Interests, Economics, and the Public. Many well known names of leaders in their special fields are to be found in the list. Some work has been done already in regard to the cost of medical and nursing education, and the Committee plans to complete its program by July 1, 1932. As all medical men are aware, there has been a gradual encroachment in various directions in the field of medical practice, which takes the form of group practice, public clinics, pay clinics, organization of hospital and medical services by great corporations, such as the railroads and industries, student health services in the universities, benevolent societies with hospital privileges; and public health is constantly extending its range. There is no common program, no statesmanship, no strategy, simply the field is gradually being occupied, with much overlapping and much dissatisfaction.

The aim of the Committee on the Cost of Medical Care is to try to develop a program which will be based on the three following groups of studies:

1. Preliminary survey of data showing incidence of diseases and disabilities requiring medical service and of the existing facilities for dealing with them.

2. Studies on the cost to the family of medical services and the return accruing to the physician and other agents furnishing such service.

3. Analysis of specially organized facilities for medical care now serving particular groups of the population.

There is considerable material available on all these points but it has not been properly digested and co-ordinated. The following subjects have been given a priority:

1. The diseases and conditions most responsible for disability and inefficiency.

4. Existing facilities for the treatment and prevention of disease and defectiveness—statistical study.

5. Surveys of the medical services of a large city, of a small city, of a rural community.

6. The cost of sickness, during a twelve months' period, among various representative population groups, including the incidence of sickness.

9. Capital investment and income in private practice.

10. Capital investment in hospitals and clinics.

11. Organized medical service in industry and in universities.

12. Pay clinics and group clinics.

GENERAL

The Thirteenth International Congress of Ophthalmology

The thirteenth International Congress of Ophthalmology, which met at Amsterdam on September 5, 1929, was the first meeting of the Congress since the war. The twelfth Congress was called for September, 1914, at St. Petersburg, and although the meetings were not held, the papers were published so that the work was not lost. In 1922, "An Ophthalmological Congress" was convened at Washington, D.C., at which there was an attendance of more than six hundred and much good work offered. At a general meeting of the members, a Committee was appointed to arrange for the re-establishment of the International Congress. Despite this, the Congress which met in London in 1925, with an attendance of more than eight hundred, had to be called "An English-speaking Congress." Another Committee, containing many members of the previous one, was appointed in London and succeeded in arranging for the resumption of the International Congress, the first meeting of which has just been held, with such signal success.

The "Thirteenth Congress" was the largest and most successful yet held. There was an attendance of more than one thousand, and papers covering practically every branch of ophthalmology, 235 in number, were offered. Three of the discussions may perhaps be regarded as outstanding. The symposium on trachoma, to which about ten papers were contributed and a map showing the incidence of trachoma throughout practically the whole world; the discussion on the "Medical treatment of glaucoma," at which many practical suggestions were made, although nothing which could be regarded as a specific was offered; lastly, "The diagnosis of supra-sellar tumours", papers concerning which were contributed by several men of world-wide reputation.

As most of the time three sessions, in different

rooms, were held simultaneously, the ordinary member could not hope to obtain full benefit from the large amount of work brought before the Congress until the proceedings have been published. So many men of note took part in the discussions that a mere list of names would be quite lengthy, and a detailed account of their contributions quite out of the question.

The importance which was attached to the Congress in Holland was evidenced by the participation of members of the Royal Family in welcoming the visitors. Her Majesty, the Queen, received the official delegates, Her Majesty, the Queen-mother, opened the Congress and the Prince des Pays-Bas (Prince Consort) acted as host at a reception given at the Royal Palace in Amsterdam, and many governors, cabinet ministers and burgomasters were honorary presidents. The civic authorities in Amsterdam, The Hague, and several other cities which were visited also accorded official recognition to the members. Excursions and entertainments were arranged for every afternoon and evening and as there was usually a choice of several trips, accommodation was ample, even for the great number who availed themselves of the opportunities offered. A special and very extensive program of entertainment was prepared for the ladies and much hospitality was extended to them. One item which aroused great interest was a visit to a diamond-cutting establishment, at which quite a few of the other sex managed to be present.

One strikingly interesting event was the exhibition, by Dr. W. H. Seters, of the Leeuwenhoek film, which is to be used in connection with the tercentenary celebration of the birth of the scientist. An illustration from one of Leeuwenhoek's works, of an organism magnified with his primitive microscope, was thrown on the film. This was followed by a moving film of the same organism, living, and photographed with much the same technique and magnification as

was used in the Canti film. As quite a large number of subjects were given this contrast treatment and photos of the primitive instruments with which the scientist did his work were shown, the result was a most instructive demonstration of very absorbing interest, which created a feeling of astonishment, even among those not unversed in the progress of modern science.

After five days in Amsterdam the Congress moved "en masse" to Scheveningen, four routes with attractive and interesting features being open to the choice of the members. Receptions at the Hague and Scheveningen and the official dinner terminated the social activities of the Congress.

Great appreciation of the unbounded hospitality extended to the visitors and of the ready welcome that met them was expressed on all hands, while the genial courtesy of the President and his officers evoked special commendation.

A good sized volume would be required to contain even a short account of the treasures of art which were exhibited for the inspection and study of the visitors, and a book of equal size would be necessary, to refer to the very numerous points of historic interest which Holland contains in such wealth and to which attention was directed, while past associations connected with them were instructively recalled.—Richard Kerry.

The Second International Pædiatric Congress in Stockholm, August 17 to August 20, 1930

After having conferred with and received the promise of support from leading pædiatricians in practically all the countries of the world, the Swedish pædiatricians have decided to issue invitations to an International Pædiatric Congress in Stockholm, to last from August 17 to and including August 20, 1930.

Those who desire to contribute papers should announce their intentions before March 1, 1930, at the latest.

The program of the congress will, if necessary, be carried on in separate groups.

It is desirable that those wishing to attend signify their intention of doing so as soon as possible, that the approximate number to be expected may be calculated, and arrangements made in good time for their housing and comfort. This is of great importance because of the Swedish Art and Industry Exposition which will be going on in Stockholm during the summer of 1930.

The admission fee to the conference is twenty Swedish crowns (about \$5.00).

All communications are to be addressed to The Second International Pædiatric Congress, Stockholm, Sweden. Telegraphic address, Pædiatric, Stockholm.

Applications for tickets of admission should preferably be accompanied by the fee, sent as a check or money order.

For the avoidance of errors, it is absolutely necessary that all names and addresses be written with printed characters or else typewritten.

Further announcements will appear later on.

I. Jundell, M.D., Professor of Pædiatrics, Committee Chairman, Kj. O. af Klercker, M.D., Professor of Pædiatrics, Lund; R. Nordgren, M.D., Chairman of the Pædiatric Section, Swedish Medical Association, Stockholm; I. Thorling, M.D., Professor of Pædiatrics, Upsala; Wilh. Wernstedt, M.D., Professor of Pædiatrics, Stockholm. Nils Malmberg, M.D., Committee Secretary. Stockholm, September, 1929.

International Medical Post-Graduate Courses in Berlin

These courses are arranged with the help of the medical faculty of the University by the Lecturers' Association for Medical Continuation Courses and the

Kaiserin Friedrich-Haus. Part of the courses take place continuously; part, only in March and October, 1930.

I. Permanent Courses

1. Of monthly and semi-monthly duration; dealing with all branches of medicine.
2. As guest-assistants in clinics, hospitals, and laboratories during two to three months and longer for gentlemen desiring to do practical work under systematic supervision.

II. Courses in March, 1930

1. Group course; Survey of modern medical science (actual questions relating to internal diagnostics and therapeutics (from March 3rd to 15th); fee, RM. 75.
2. Post-graduate course; covering the domain of skin and venereal diseases (from March 17th to 29th); fee, RM. 100.
3. Obstetrical-gynaecological post-graduate week (from March 24th to 29th); fee, RM. 50.
4. Fifth post-graduate course on practical improvements in ray-therapeutics (from March 30th to April 7th); fee, RM. 100.
5. Special course on surgery (from April 28th to May 3rd); fee, RM. 75.
6. Single courses on all special fields of medical science, including practical work.

III. Courses in October, 1930

For October, 1930, the following courses are planned: (1) A practical laboratory course; (2) a course on children's diseases; (3) a course on internal medicine; (4) a course for ophthalmologists; (5) a course on trade medical science, insurance medical science, and the experts' profession.

The courses are held in German, but numerous professors are able to lecture in the English, French or Spanish languages.

The information bureau of the Kaiserin Friedrich-Haus für das ärztliche Fortbildungswesen, Berlin, NW. 6, Luisenplatz, 2-4 is instrumental in procuring suitable lodgings, gives information as to cost of stay, arranges the attendance in clinics at operations, etc., and, upon desire, will send detailed syllabuses.

Blind Masseurs

Mr. J. Cohen has been seeking in Belgium the approval of eminent medical men in the four Belgian universities of a plan to establish in Belgium: (1) a central school, under the approval, authority and direction of the state and of competent members of the medical profession, for furnishing complete instruction in massage to blind persons—men and women judiciously selected; (2) an advanced diploma, the same for all of Belgium, to be delivered to the blind and to persons who can see, pupils of the school mentioned who have pursued the courses with profit and obtained grades of at least 50 at an examination officially organized, before a board composed of representatives of the various administrations concerned, and (3) an association of certificated blind masseurs similar to the associations existing at present in England, the purpose of which is the supervision of its members—their well-being, and the defense of their general interests.

At present, the National Institute for the Blind Association of Certificated Blind Masseurs gives in England entire satisfaction to the medical profession and the general public, by assuring the training of blind masseurs who are competent and reliable.—Belgian Letter, in *J. Am. M. Ass.* 93: 783, Sept. 7, 1929.

German Statistics on Tuberculosis

The April number of the bulletin of the International Union Against Tuberculosis gives for 1926 a general death rate of 1.168 per 100,000; tuberculosis all forms 98 per 100,000. Their highest tuberculosis death rate is for the ages 15-30 years. Males have a rate of

1.216 compared with females of 1.123 for all causes, but the tuberculosis death rate is 98 and 97 respectively.

Germany reports 1,988 dispensaries operating for the tuberculous and 29,661 sanatorium beds available for pulmonary cases, 2,323 for other forms of tuberculosis, and 19,587 beds available for any form of tuberculosis. Germany's population served is given as 62,866,000.

Book Reviews

Surgical Diseases of the Thyroid Gland. E. M. Eberts, M.D., Surgeon to the Montreal General Hospital, and Associate Professor of Surgery, McGill University. With the assistance of R. R. Fitzgerald, M.D., and Philip G. Silver, M.D. 48 engravings. Lea & Febiger, Philadelphia, 1929.

In this small octavo volume of 238 pages, Dr. Eberts has presented the profession with a very valuable monograph on a most important subject; a subject presenting many complex problems regarding which a voluminous literature has accumulated during recent years. The monograph represents the knowledge and practical results obtained from an unusually large experience in the Goitre Clinic of the Montreal General Hospital, and the final opinions of the writer as modified by an intensive study of the experience and writings of others on both sides of the Atlantic.

To quote from the foreword of Dr. Edward Archibald, Director of the Surgical Clinic of McGill University, there is not only room in medical literature for such a book, but there is a real need. In it one finds set forth, in concise and yet clear and descriptive diction, the knowledge gained from a careful and complete study, both at the bedside and in the laboratory, of more than 2,000 cases of disease of the thyroid gland; together with the results of treatment, in which a careful watch was kept on the patients for one or more years after discharge from the hospital.

The contents are divided into two parts. The first part describes the embryology, histology, physiology and pathology of the gland. The numerous illustrations are excellent and are all original. The second part is entirely clinical and includes chapters on Juvenile or Adolescent Goitre, Graves' Disease, Iodine Thyrotoxicosis, Adenomatous disease both toxic and non-toxic, and on the several inflammatory conditions of the gland. The descriptions of the various forms of thyroid disease are clear and concise. Treatment, both clinical and surgical, is fully discussed, and brief case reports add to the clarity of the presentation.

Long discussions on the yet unsolved problems of etiology are avoided, and while the views of other writers are briefly stated the personal experiences and views of the writer are definitely presented. In reference to Graves' disease Dr. Eberts gives it as his opinion that, while incipient cases may be cured by rest in bed and the administration of iodine, experience has shown that patients with a well established syndrome are rarely restored to normal health by these measures; on resumption of normal life or in the event of any subsequent infection, they are very liable to develop a return of the symptoms in an aggravated form. The final results in his clinic appear to prove that operation offers to these patients the surest hope of recovery.

This volume can be recommended as a clear presentation of our present knowledge of the diseases of the thyroid gland and will prove a useful guide book for the student, general practitioner, and busy practical surgeon, everyone of whom can consult its pages with profit and with the pleasure always connected with reading of facts and opinions well considered and well expressed.

A. D. BLACKADER

Trauma, Disease, Compensation. A. J. Fraser, M.D. Pages 516. Price \$6.50. Toronto: Macmillan Co. of Canada, 1929.

To those who are interested in the legal side of medicine, and more particularly in the operation of Workmen's Compensation laws, perplexing questions often arise in connection with the gradual merging of accident into disease. It is generally admitted that compensation for industrial accidents is fairly chargeable to the operating cost of industry; but often an accident, normally trivial, initiates a condition of considerable gravity. It is true that an employer is not responsible for one of his men having latent tuberculosis or syphilis; but neither is he responsible for a defective casting in one of his machines. Injury to the latter may produce a serious break, and injury to a sub-standard individual may activate a process which without the injury would have remained quiescent. Dr. Fraser has conceived the unique idea of writing a book on the subject of "the influence of trauma giving rise to subsequent conditions of disease." If you wish to know the relationship of syphilis, tuberculosis, cancer or any other disease to trauma and compensation you will find it in this book.

The work is largely made up of quotations from medical authorities and from records of various Workmen's Compensation Commissions. Injury and diseases of the various systems are treated chapter by chapter, beginning with the nervous system, and proceeding through the circulatory and gastro-intestinal to all the other systems. In order to miss nothing the author appears sometimes to go unnecessarily deeply into the subject, and lesions are mentioned which have no conceivable connection with accidental injury. For example, a page is devoted to blepharitis, and another to herpes zoster ophthalmicus and episcleritis, but no connection is traced between these diseases and industrial trauma. On the other hand such conditions as hernia and silicosis, which are constant thorns in the sides of Workmen's Compensation Commissioners, are discussed more briefly than their importance in compensation work appears to warrant. However, these criticisms are not very serious.

There is in this book a mine of information, which heretofore has not been readily accessible to the medical profession. The perplexed compensation commissioner or referee may also find much to guide him in his decisions. Dr. Fraser has wisely selected authorities who occupy prominent positions in their various fields, and has drawn most of his material from standard text-books rather than periodicals.

The printing is good and the index comprehensive. This book should fill a very definite place in the medico-legal field.

FRANK G. PEDLEY

Diseases of the Chest and the Principles of Physical Diagnosis. G. W. Norris and H. R. M. Landis. Fourth edition, revised. 954 pages, profusely illustrated. Publishers: W. B. Saunders, Philadelphia, McAinsh & Co., Toronto, 1929.

Fears are sometimes expressed that clinical methods of examination are being discarded in favour

of laboratory and mechanical aids. The apprehension that this may occur is not unfounded, for these auxiliary aids are becoming steadily more and more accurate, within their limits, and the temptation to regard them as infallible is the harder to resist. Another reason is that the clinical method, which must always demand powers of steady attention, of observation, and of reason (quite apart from the indefinable "clinical sense," which is so strong and unerring in some and so entirely lacking in others who yet may have all the other qualities in the highest degree) will always be hard to master. No single requirement in medicine is more difficult of attainment than accurate percussion, and next to it is that of translating auscultatory observations. And even when these are mastered the diagnosis is by no means always complete. It is little wonder that the x-ray or the electrocardiograph with their confident, clear cut statements, are so apt to be regarded as the final or even the sole court of appeal. The lazy will therefore always depend chiefly on mechanical aids, and in most cases they will serve him with perfect satisfaction. Even he, however, if he ever felt the higher satisfaction that attends the practice of an art, will sometimes appreciate the joy of diagnosis by means of his own capacities.

Books such as the volume under review will appeal strongly to those who wish to perfect their own powers of diagnosis, and to refresh their memory regarding the principles on which the various methods of examination are based. The best part of the book is that concerned with physical diagnosis. No effort has been spared to make it complete and the printing and illustrations are so very good as to make an immediately favourable impression. Special attention has been given to that difficult subject, the acoustics of the chest, and the chapter by Dr. Montgomery on transmission of sounds through the chest is valuable, though not easy reading.

It is a pity that not more care was taken in the proof reading. Misprints occur frequently; that of "mucous" when "mucus" is clearly meant being especially irritating. Proper names, too, suffer considerably. These mistakes will probably be attended to in the later editions which the book will certainly pass through, for it is a sound and satisfactory work.

H. E. MACDERMOT

An Index of Symptomatology. Edited by H. Lethby Tidy, M.A., M.D., F.R.C.P. 710 pages, 130 illustrations. Price \$12.00. Bristol, John Wright & Sons. Toronto, Macmillan Co. of Canada, 1929.

This volume makes the fourth in Wright's Index series in medicine and surgery, the others being the well known volumes on Differential Diagnosis by French, Treatment by Hutchison and Sherren, and Prognosis by A. Rendle Short. The editor contributes more extensively than those associated with him. He has a corps of outstanding physicians and surgeons who write on subjects with which they are particularly conversant, with the result that the work should represent the last word in the symptomatology of disease as taught in British medicine. The subjects presented cover the general range of medicine, surgery, gynaecology, and the various specialized lines of practice. We shall not attempt to give the list of contributors—they are all outstanding men in English hospitals and medical schools, teachers and writers. An attempt has been made to give a clear and concise account of the symptomatology of medical and surgical diseases, without unduly stressing complications and variations. Written in the form of an index, diseases appear in alphabetical order and not classified as in the usual text-book of systematic medicine. To include all diseases, medical and surgical, in one volume has forced the editor to make the descriptions concise, and bring out only the most important features of each.

It includes the more usual conditions met with in practice and provides a ready reference book, not an exhaustive treatise on each subject. As such it should find a ready welcome. In another edition we should like to see more reference to industrial and occupational diseases, and in a condition such as asthma more detailed reference to etiology, treating the asthma as a symptom, the cause of which must be found if satisfactory therapy is to be instituted. The book is a splendid companion volume to its predecessors in the series.

J. H. ELLIOTT

Rickets, Including Osteomalacia and Tetany. Alfred F. Hess, Clinical Professor of Pediatrics, University and Bellevue Hospital Medical College, New York. 485 pages, 52 illustrations. Price \$5.50. Lea and Febiger, Philadelphia, 1929.

This volume is a monument to the industry of the author, both as an individual research worker and clinical observer and as a student of the literature on these subjects. As he states in the preface, "It is realized that our knowledge of rickets is far from complete, and that new and important discoveries of various aspects, particularly in regard to pathogenesis, may be made in the not far distant future. But so much has been accomplished in the past decade and so remarkable has been the change in our clinical and scientific point of view, that the time seemed ripe to garner the harvest without waiting for additional crops." As a review of the recent literature on the subjects discussed, the labour accomplished is amazing.

The book is an attempt to assemble our existing knowledge—clinical, experimental and metabolic—gathered from the literature of the past ten years of the pathology, symptomatology, and therapeutics of these diseases, and while there is nothing included in the volume which has not been previously published, it does fulfil the object of bringing into a small compass all that is known of these three disorders. Much of it is a critical review of the literature, amplified by illustrative cases from the author's remarkable experience in the clinical study of rickets.

The chapter on osteomalacia shows the probable relationship of this disorder to rickets, and suggests that, though this disease may be refractory to cod liver oil, it should be amenable to irradiated ergosterol. Tetany is thoroughly covered, the literature critically reviewed, and methods of treatment outlined. The therapeutics of rickets, prophylactic and curative, in view of our newer knowledge, is discussed in the last chapter.

The book is well arranged, not too voluminous, and the ideas clearly expressed. It has, however, the misfortune that it is printed on very smooth paper, consequently causing fatigue in reading.

R. R. STRUTHERS

Tuberculin in Practice, Its Value in the Treatment of Early Tuberculosis and Asthma. F. E. Gunter, D.S.O., M.D. 102 pages. Price 7/6 net. The Gregg Publishing Co., London, W.C.2, 1928.

In a short review of the history of tuberculin the author says "a dogged perseverance has satisfied a few that tuberculin when properly used is of value in the diagnosis and treatment of tuberculosis."

He shows that when the diagnosis is made in the symptomatic stage before the disease is established at the apices of the lung, in cases without fever or marked emaciation, this method of treatment proves an efficient substitute for the sanatorium in many cases, and a useful addition in others. He must have been able to diagnose his cases very early indeed, as only 48 per cent of these showed physical signs in the lungs. In addition to symptoms he depends for diagnosis on a modified cutaneous test, using high dilutions of tuberculin, and upon x-ray examination. Dr. Hernaman-Johnson, on the other hand, in an excellent chapter on

x-ray and tuberculosis says "the first stages of the disease must inevitably elude x-ray examination."

Having first selected his cases, pre-eminently hypersensitive cases, without actual pulmonary disease, he proceeds to describe his method of treatment. Commencing with a liniment containing tuberculin he goes on to intramuscular injection of doses graduated to avoid reactions. The few illustrative cases, perhaps owing to insufficiency of detail, leave the present reviewer unconvinced as to the efficacy of this method of treatment.

This book is a fair presentation, for the beginner, of the case for tuberculin in diagnosis and treatment.

D. B. MENDEL

Principles and Practice of Electrocardiography. Carl J. Wiggers, M.D., Professor of Physiology, Western Reserve University, Cleveland. 226 pages, illustrated. \$8.00. St. Louis: The C. V. Mosby Company; Toronto, McAinch & Co. Limited, 1929.

Canadian practitioners and specialists will welcome this simple yet comprehensive book covering the use of the various models of the Einthoven string galvanometer. The second part analyses the normal electrocardiographic deflections and correlates them with the physiological cardiac action. This is followed by the effects of abnormal mechanism on heart tracings. The terminology commonly used, without which the practitioner suffers a serious handicap, is described in a lucid and concise manner. The time relations of the variations showing auricular and ventricular activity are explained, beginning with the preliminary P, denoting the auricular complex to the final T, where ventricular activity ceases. Chapter VIII deals with the principles and theory of the causes of monophasic and diphasic currents, and the calculation of electrical axes.

The real value of the book to the practitioner lies in the careful study of abnormal deflections and complexes, viz., alteration of the P wave, aberrant QRS complexes, complexes of bundle branch and arborization block and T wave abnormalities. Ten pages are devoted to irregular heart action, for which electrocardiography is the method par excellence. Extra systoles (so common in practice) are explained, together with their differentiation from the more serious irregularities. There are chapters covering description of records and diagnosis and treatment for each of the following subjects, viz., the tachycardias, bradycardia and nodal rhythm, auricular flutter and fibrillation, hypertrophies and associated simple arrhythmias. Last, but not least, there is an illuminating chapter on "The electrocardiogram in coronary disease," so important in modern medicine.

The whole book reflects the twelve years' experience of a teacher of practical courses as well as a master in the workings of most of the electrocardiographic apparatus in use to-day. The book deserves a place on the bookshelf of every up-to-date physician.

C. R. BOURNE

Orthopaedic Surgery. Sir Robert Jones, Bart., K.B.E., C.B., Ch.M., F.R.C.S., F.A.C.S., and Robert W. Lovett, M.D., F.A.C.S. Second edition revised. 807 pages, 792 illustrations. Price \$11.00. Wm. Wood & Co., New York, 1929.

This is a beautiful volume of 800 pages. It is profusely illustrated and interestingly written. There are so many additions to, and changes from, the text of the edition of five years ago that attention is necessarily directed to only a few of them. The section on stiffness of joints gives, for instance, a very full description of Volkmann's ischaemic paralysis. Under Arthritis deformans, more attention is paid to operative treatment in developmental as well as adult

bone affections. The subject matter is discussed fully. Kolodny's classification of bone tumours is preferred to that of Codman, as being more easily remembered by the student. Under scoliosis there is given, though apparently not quite up-to-date, the treatment by the twin-buckle jacket, as well as that of Galeazzi of Milan. The indications for fixed operations in the spine are interestingly given. Vascular lesions of the extremities, such as thrombo-angiitis obliterans and Raynaud's disease, are described with Brown and Henderson's classification. Entirely new chapters or sections have been written on osteomyelitis, affections of tendons, muscles and fasciae (with much on the treatment of the infected hand), peripheral nerve injuries and their operative treatment, as well as amputations and artificial limbs.

Much more attention has been paid to backache and spondylitis than to fractures of the spine. Fractures of the extremities are well described, both the fresh and those showing mal-union and non-union. The subject of "claw-foot," missing in the previous volume, is here described in full.

The book reflects the greatest credit on Sir Robert Jones and his staff of collaborators. The orthopaedic profession generally will take pride in it. Its international character is reflected here and there in the conservative estimate given to procedures dear to the heart of clinics on this side of the Atlantic. Views of the Boston schools are given somewhat more widely than those of New York.

This is a splendid book which the reviewer finds it difficult to lay down.

J. A. NUTTER

Diseases and Deformities of the Spine and Thorax. Arthur Steindler, M.D., F.A.C.S. 573 pages, 76 plates. Price \$13.50. St. Louis, C. V. Mosby Co.; Toronto, McAinch & Co., 1929.

A book written by a Professor of Orthopaedic Surgery, on Diseases and Deformities of the Spine and Thorax, should receive a very generous welcome. So few of us are orthopaedic-wise; so few of us have orthopaedic judgment; but so many have an orthopaedic conscience. Steindler has given us a book which is a departure from the usual plan of medical literature, and on which he should be congratulated. He states that medicine is never light reading, nor does he intend to give us an easily readable book. He has dispensed with the gravy and given us all meat.

The book is composed of ten chapters, and each chapter is in the nature of a monograph. In order, he discusses Congenital deformities of the spine; the Static and static-constitutional antero-posterior deformities of the spine; Scoliosis; Low back pain; Tuberculosis of the spine; Osteo-myelitis of the spine; Syphilis of the spine; Chronic arthritis of the spine; Tumours of the spine; and lastly, a Synopsis of the anatomy of the spine.

A reading of the last chapter would be helpful before beginning the book, in order to freshen one's knowledge of the anatomy. Each chapter is supported by excellent plates. The x-ray pictures are especially good and are well placed in the book.

The author has reviewed the literature on orthopaedics very completely, and the book shows careful presentation of every statement. He has refrained from dogmatizing in discussing therapeutic methods. He reveals opposing opinions frankly, but does not leave one in doubt as to which is the proper procedure. As the author states, "when the object of the treatment is fully explained and the salient points of the technique are given, obvious and self-evident details of technique can often be spared the reader who is expected to be conversant with general surgical routine." Steindler therefore has dispensed with the finer details of treatment. He hopes to create in the mind of the general practitioner that orthopaedic con-



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science stressed by Sir Robert Jones. This book will be a great help to the general practitioner as well as to the surgeon, more especially to the country practitioner, who sees the case for the first time, and who has to send the case to the nearest city for orthopaedic treatment.

H. M. YOUNG

Osteomyelitis and Compound Fractures. H. Winnett Orr, M.D., F.A.C.S. 208 pages, illustrated. Price \$5.00. St. Louis, C. V. Mosby Co.; Toronto, McAinsh & Co., 1929.

This monograph, if so it may be called, consists of about 208 pages, and is an extended dissertation on the so-called "Orr Method" of treating infected and potentially infected wounds. The printer's work is satisfactory; the x-ray illustrations and the photographs of the author's cases, and of others, are fairly good. There are numerous case histories, too numerous for a book, and the continuity of the presentation is seriously impaired by this and the author's wide-afield Chapter I on "Sir Joseph Lister and Antiseptics."

After reading the volume through I turned to page nineteen of the introduction by John Ridlon, and considered that the following paragraph—John Ridlon's—was what the book was all about! "Do an operation that will insure free drainage, drainage without rubber tubes, or gauze wicks or other drains. Make a wound that will drain itself. Cover the raw surface of bone and flesh with a smooth and unirritating dressing (vaseline gauze), with enough pressure to insure healthy granulations. Rest the entire wound by a plaster cast that will immobilize the joint below and the joint above the wound. Then observe the patient—not the wound alone."

The second division can be of no great general interest, as it is largely made up of United States Army correspondence, papers, reports, and the author's adverse criticism of the Carrell-Dakin method and Williams' mobilization method of treating infected joints.

The chapter on osteomyelitis is the best in the book, and clearly demonstrates the method of "saucerization" of the area of bone disease, its packing by vaseline gauze wide open, covered smoothly by the same dressing, its padding and the encasing of the limb entirely in plaster of Paris, and leaving it alone for two, four or more weeks, unless evidence of acute sepsis occurs. The illustrations of "fixed traction" by moleskin strips turned back over the plaster while the limb is in extension, or by ice tongs imbedded in the cast, are clear, and offer a practical method of controlling position and extension during or after removal from the operating table. More than fifty pages are devoted to "Clinical Results" and afford a very tiresome way of converting surgeons to the "Orr Creed."

On the whole the book will appeal chiefly to those who deal mostly in emergency surgery of the extremities, and it is by no means a classic on this particular branch.

C. K. P. HENRY

Surgical Diseases of Children. S. W. Kelley, M.D., LL.D., F.A.C.S. Two volumes, 1374 pages. Price \$17.00. St. Louis, C. V. Mosby Co.; Toronto, McAinsh & Co., 1929.

The systematic order of this work makes it easy to read and easy to look up any subject in regard to the surgery of children. One cannot entirely separate surgical paediatrics from medical paediatrics, and the author wisely does not attempt this. The examination of the child, the signs and symptoms of disease, are well taken up, and the surgical treatment given, at times only sketchily. There is no attempt to give a detailed, comprehensive, description of the operative procedures necessary—the work is not an operative

surgery for children. The surgical steps are indicated and the author leaves to the surgeon the technique of the actual operation. On the other hand, non-operative surgical treatment is clearly and concisely described, for example, the treatment of burns, where the tannic acid treatment of Davidson receives adequate space and detailed description.

The chapters on acute disease of bone and tuberculosis of bone are adequate, and yet one wonders why tuberculosis of the spine is not included here. Fractures and dislocations are discussed very briefly in general, and clearly in detail, for each bone, with the various varieties of fracture. Splints and methods of treatment are well illustrated. Less than a page of reading and three illustrations dismiss Hodgkin's disease and no mention is made of the recent work of Wallhauser and Whitehead with gland extracts.

It is remarkable that the author dismisses tonsillectomy with a description of his own method of dissection and removal by a wire snare, not even mentioning the Sluder operation, while devoting several pages and illustrations to an obsolete method of tonsillectomy.

The surgery of the gastro-intestinal tract in children is so much like that of the adult that one need only comment on the surgery of diseases peculiar to children, as pyloric stenosis, intussusception, megacolon, etc. These are well handled, and the article on appendicitis in children is very aptly written indeed. Throughout the whole work there is considerable space given to congenital deformities, malformations, and various anomalies. The surgical treatment is clearly indicated, and is especially comprehensive in the various varieties of imperforate anus. This is of special value to the surgical paediatrician, as in many of the surgical systems these conditions are not minutely described nor is the treatment given with enough detail.

The author's method of adhesive strapping for hare lip immediately after birth is well illustrated and should be known to all practitioners. It pulls together the bony cleft and makes so much easier and more successful the subsequent operation of lip suture (cheiloplasty). The illustrations and the text are remarkably easy to follow and are unusually good. Even the after dressing of silk gauze with collodion over it offers a decided advantage over that commonly used.

The two volumes will be of great value to the general practitioner who has to do most of his own surgery, as well as to the operating surgeon who is not doing a great deal of surgery on children and infants. To the paediatrician and the teacher it makes the best work available for reference, and will fill the gaps so frequently found in the larger systems of surgery. As it is now in its third edition the demand for a work of this kind must be widespread. It is thoroughly recommended and the author is to be commended for such an excellent work.

C. K. P. HENRY

The Treatment of Fractures. Lorenz Bohler, M.D. Translated from the German by M. E. Steinberg, M.S., M.D. 185 pages, 234 illustrations. Wilhelm Maudrich, Publisher, Vienna, 1929.

This work, originally in German, has been translated into English by Steinberg and makes a compact volume of some 185 pages. The text is divided into two parts, general and special. The general part deals with general principles and management, fundamental laws, and treatment. In the author's work, local anaesthesia has entirely displaced general anaesthesia during reduction.

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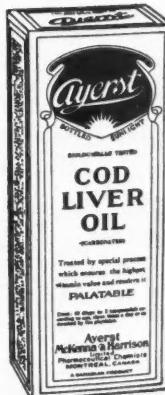
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how to do it. The book has every appearance of being of real value to those engaged in fracture work.

R. V. B. SHIER

Some Principles of Minor Surgery. Zachary Cope, M.S., M.D., F.R.C.S. 159 pages, illustrated. Price \$3.25. London and Toronto, Oxford University Press. McAinsh & Co., Toronto, 1929.

As stated by the author in the preface, this book is not an attempt to cover the wide field of minor surgery, but rather to stress elementary principles, more particularly for the reading of post-graduates. The outstanding feature of the work is the chapter on infections of the hand, which amounts to a summary of the teaching of Kanavel. In this chapter several superimposed drawings are used to excellent advantage. Altogether, this is a valuable book on the subject of minor surgery.

R. V. B. SHIER

Surgical Pathology. Cecil P. G. Wakeley, F.R.C.S., F.R.S., Hunterian Professor, Royal College of Surgeons, England, and St. J. D. Buxton, M.B., B.S., F.R.C.S., Junior Surgeon, King's College Hospital. 904 pages, 392 illustrations. Bristol, John Wright & Sons. Toronto, Macmillan Co., 1929.

This Surgical Pathology is really an acquisition, not only for students but surgeons also. Inflammation and gangrene are discussed in a very enlightening manner. Tumours are well described and both gross and microscopic pathology fully discussed. Surgical tuberculosis is well covered as are also the non-tuberculous arthritides. Intracranial tumours are discussed so far as the general surgeon is concerned. The pathology of the nose, throat and larynx is concisely reviewed. The pathology of the gastro-intestinal tract is well written and the illustrations are very instructive. The final chapters concerning genito-urinary pathology are comprehensive and well illustrated. The book is well written throughout, the paper is excellent, the print clear, and the whole is a credit to any publishing house.

R. B. MALCOLM

The Autonomic Nervous System. Albert Kuntz, Ph.D., M.D. 576 pages, 70 illustrations. Price Lea & Febiger, Philadelphia, 1929.

From this work one is able to visualize the autonomic nervous system as an intrinsic whole, with its relationship and its distribution definitely established. The ganglion cells and their connections are well described; the centres in the central nervous system are clarified; the general physiological action and interaction with the endocrine glands are specially dealt with. One is carried back to the development of the autonomic nervous system and sees relationships which are of paramount importance.

In other chapters the author takes up particular systems with reference to their autonomic innervation, paying special attention to the heart, the blood-vessels, the respiratory system, the urinary system, the sex glands, the eye and the skeletal muscles, and he gives a comprehensive survey of the physiological action. In the final chapters, the general pathological alterations are attended to with special reference to the histological changes, referred pain, vagotonia, and sympatheticonia. Finally, opinions are given as to the relationship of the autonomic nervous system to some phenomena in disease, such as the correlation of some endocrine disturbances, the explanation of reflex disorders of the digestive tracts, gastric and duodenal ulcers, and many other abnormalities.

Probably the most enlightening chapter is the last, when the author discusses the pros and cons for surgery of the autonomic nervous system in such conditions as spastic paralysis, in diseases of the blood-vessels, in angina pectoris, in bronchial asthma, in

Hirschsprung's disease, in hyperhidrosis and in visceral pain. This chapter is worth careful study, because it gathers concisely the recent trends of this particular aspect. A complete bibliography is included, which adds considerably to the value of this book in offering an up-to-date treatise on the autonomic nervous system. There is no better book in the English language on the subject.

A. W. YOUNG

The Nose, Throat and Ear and Their Diseases. Edited by Chevalier Jackson, M.D., Sc.D., LL.D., F.A.C.S. and George Morrison Coates, A.B., M.D., F.A.C.S. 1177 pages, 657 illustrations. Price \$13.00. London & Philadelphia, W. B. Saunders Co., Toronto, McAinsh & Co., 1929.

This work consists of original contributions by some 70 American and European authors. Besides the editors, others of special note are, Sir StClair Thomson of London, and Logan Turner of Edinburgh, while it will be a satisfaction to Canadians to find Birkett of Montreal entrusted with an extensive contribution. Several Parisians are also included.

The book is divided into four parts—the Nose, the Pharynx and Naso-Pharynx, the Ear, and the Larynx. In each the anatomy is carefully and concisely considered with the aid of adequate illustrations. Disease is dealt with under uniform headings and treatment is discussed with a consideration and lack of dogmatism, which is refreshing to the reader whom practice has taught the pitfalls of empiricism. In general, the description of operative technique is satisfactorily aided by excellent diagrams.

Of special interest is an article on tonsilloscopy. It opens with the remark, "The trend of the world's medical literature is strongly in opposition to the surgical practice which has been in vogue for a generation or more of enucleating the faucial tonsils without a positive knowledge of the existence of potential pathogens within those lymphoid organs." This newer method is based upon the art of trans illumination.

Birkett's chapters on the tonsils and tonsil operations contain a mine of information. The functional testing of hearing and the treatment of deafness will be found to be very fully covered, as also the diagnosis of intracranial complications from aural suppuration. There is a useful chapter also on anaesthesia in operations on nose, throat and ear. Diseases of the larynx occupy nearly 400 pages. Syphilis is dealt with by Logan Turner and Carcinoma by Sir StClair Thomson, while Chevalier Jackson writes on Endoscopy.

This book is intended primarily for the specialist, though it will prove valuable as a reference work for the general practitioner and the house surgeon. It embodies a real, and, we think successful, effort to produce a reflection of what is best in modern practice. There are more than 600 illustrations and a comprehensive index.

PERCY G. BELL

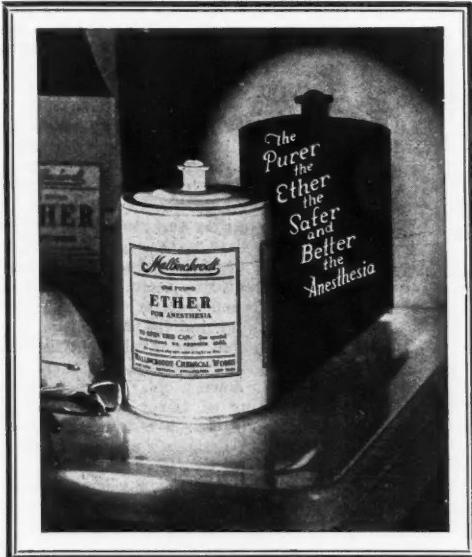
Manual of Diseases of the Nose, Throat, and Ear. E. B. Gleason, M.D., LL.D. Sixth edition, revised. 617 pages, illustrated. Price \$4.50. London & Philadelphia, W. B. Saunders Co., Toronto, McAinsh & Co., 1929.

This book made its first appearance in 1907 and has been revised numerous times and kept up to date, which is good evidence of the popularity this author's work has received.

In his own words the outstanding purpose for which his book was written is that it should be a manual "to supply students and general practitioners with the essential facts of rhinology, laryngology and otology." He has emphasized various treatments in sufficient detail to make them of practical value to the general practitioner. In it the specialist recog-

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nizes methods of treatment with which he is familiar and finds a variety from which to choose. The author's long experience in this specialty has well qualified him to express his views on results obtained.

A unique feature is found under "Formulas" at the end of the book. The action of the various drugs recommended is described in sufficient detail to give the reader an intelligent idea of their uses. This is very often omitted in larger books and has made the use of various drugs in the nose, throat and ear somewhat vague to those who are not observing frequently or have not large experience to draw upon. The sections on diagnosis, pathology, etc., are carefully dealt with, in sufficient detail to give a clear understanding of the problems mentioned, and the author has added numerous illustrations.

The book is distinctly valuable, more especially to the general practitioner, and one feels that the author has given his readers much interesting information.

H. H. BURNHAM

Roentgenology. The Borderlands of the Normal and Early Pathological in the Skiagram. Alban Kohler, Prof. Dr. med., Wiesbaden. Translated by Arthur Turnbull, M.A., B.Sc., M.B., Ch.B. 556 pages, 24 illustrations. Price \$12.00. Baillière, Tindall and Cox, London; Macmillan Co. of Canada, Toronto, 1928.

This classical work is indispensable to radiologists and to orthopaedic surgeons. It is an excellent translation from the fifth German edition by Dr. Arthur Turnbull. The translator has done his work admirably and although at times he has given a rather literal translation, it is a good fault. The ripe experience of the author shines through each page. He has added the leading references on each section, which makes the book still more useful. Dr. Kohler emphasizes his main object in the sub-title "The borderlands of the normal and early pathological in the skiagram." In this respect the volume is unique. The slight changes in bony structure are interpreted and pointed out in the clear line drawings taken from actual skiagrams. This method of illustration has much to commend it, as so much fine detail is lost in the reproduction of skiograms on a small scale. In addition to the bony structures of the body, there are sections on the viscera.

J. BEATTIE

On Prescribing Physical Treatment. Matthew B. Ray, D.S.O., M.D. 179 pages, illustrated. Price 10/6 net. Wm. Heinemann, Ltd., London, 1929.

This work, as the name implies, is a moderately brief description of the subject of physio-therapy, with practically the whole emphasis laid on the matter of the prescribing of this form of treatment. The author, after a brief introduction, devotes a chapter to the elementals of physio-therapy, i.e., the anatomy and physiology of the skin, other physiological considerations, effects of treatment, immediate and secondary reactions, etc. Then the various physical agencies are taken up, viz., light, heat, water, electricity, massage, etc. The general arrangement being: (1) a brief description; (2) physiological effects; (3) indications for their use in the treatment of diseases.

Physicians and surgeons who do not themselves practise physio-therapy, but who have occasion from time to time to refer their patients to non-medical but trained workers in this field will find in this book a most useful and complete guide to the prescribing of the particular type of physical treatment required.

NORMAN BROWN

Physical Therapeutic Technic. Frank Butler Granger, A.B., M.D. 417 pages, illustrated. Price \$7.00. London & Philadelphia, W. B. Saunders Co. Toronto, McAinch & Co., 1929.

In his preface the author states, "That this book has not been written for the specialist in physical therapy. . . . It is intended however, for the physician, who has installed a limited equipment. . . . and who can undoubtedly do good in carefully selected cases." Twenty-five years' experience as therapist, as director of army physio-therapy, and as teacher of physical therapeutics, qualify the author to deal with his subject in a manner which should be of value, not only to the beginner, but to the specialist.

The earlier pages deal in a satisfactory manner with necessary physics, and the various currents used. The section on the electromagnetic spectrum and light therapy is carefully handled, as also the part devoted to diathermy. Hydro-therapy, massage, and the uses of carbon dioxide snow, receive concise treatment. Chapters 16 and 17 are devoted respectively to the requisites for adequate teaching of physio-therapy, and the establishment of a hospital physio-therapy department.

The book is, however, essentially clinical, and methods of treating those diseases which yield best to physical agents, comprise the major part of the book. Chapters 19 to 34 deal with such diseases, or group diseases, in detail, describing indications and contraindications, with requisite technique. The much discussed non-surgical removal of tonsils is dealt with wisely, and in an unprejudiced manner.

The reader will find the chapter entitled "Index of disease", unique in the handling of therapeutic technique. Here is laid down a clear, concise, and practical table for the treating of those pathological conditions for which physio-therapy is a reasonably suitable treatment. This index is arranged alphabetically and is a very complete guide of treatment technique, and will be of great practical value to the physician using it.

"It goes without saying that physio-therapy should be prescribed only after a careful examination has been made, both physical and laboratory. . . . All therapy should be applied with brains." This quotation proves that the author appreciates the full meaning of treatment, and the physician who follows the author's technique in physical therapy will find much satisfaction both for himself and his patient.

L. R. HESS

Mechano Therapy. Mary Rees Mulliner, M.D. 265 pages, 57 illustrations. Lea & Febiger, Philadelphia, 1929.

The author has had a wide experience in teaching and practice, and is well qualified to write on the subject of massage and remedial gymnastics, for which she has used the somewhat unusual, though appropriate, title of "Mechano-therapy." Dr. Mulliner was formerly instructor in the Summer School at Harvard and in the Sargent School of Physical Education.

The book is written mainly for students, but will be found interesting and instructive by medical practitioners as well, especially those who practice physio-therapy. It is well illustrated and contains a very comprehensive bibliography, with brief comments on the books mentioned. Special features of the book are the chapters on relaxation and faults of posture.

F. W. HARVEY

A Manual of External Parasites. Henry Ellsworth Ewing. 225 pages, illustrated. Price \$4.50. Charles C. Thomas, Publisher, Springfield, 1929.

This book deals only with the five major groups of ectoparasites, the mites, ticks, biting lice, sucking lice, and fleas, with an added chapter on new genera of ectoparasites.

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group is dealt with in considerable detail, with special reference to external anatomy, life history and habits, origin and relationships, and economy. There are suggestions for control; and at the end of each chapter there is a list of the more important literature dealing with the group under discussion.

This little book, while not of special interest to general practitioners, should be of great value to students of tropical medicine and to public health officers.

HAROLD ORR

Forensic Medicine and Toxicology. By the late Frederic John Smith. Third edition revised by George Jones, M.B., M.R.C.S., L.R.C.P., D.P.H. 440 pages. Price \$3.00. Macmillan Co. of Canada, Toronto, 1929.

This is a third edition of F. J. Smith's pocket volume lectures at the London Hospital which first appeared in 1900, with a second edition in 1908. The part relating to law has been brought up to date as regards English procedure. It is rather more than an outline of lectures, but omits case reports. For the student it would appear to cover the ground for examination purposes, and there is much which will be of service to the physician called to give evidence in court.

J. H. ELLIOTT

Bodily Changes in Pain, Hunger, Fear and Rage. Walter B. Cannon, M.D., S.D., LL.D. Second edition, 404 pages, illustrated. Price \$3.00. D. Appleton & Co., New York, 1929.

This book is based upon investigations conducted in the Harvard physiological laboratory by the author and his associates over a period of years. It deals with various physiological adaptations of the body to major emotions such as pain, hunger, thirst, and fear. These reactions are clearly demonstrated by a series of experiments which, though surprisingly free from technical detail, yet convey to the reader the impression of thoroughness and accuracy. They demonstrate clearly a group of remarkable alterations in the bodily economy which may be reasonably regarded as responses adapted to the individual's welfare and preservation.

The first chapters deal with experiments devised to demonstrate the function of the adrenin mechanism which comes into play instantly at the call of these various emotions. The increased outflow of adrenin which results is responsible for diverting the blood from the splanchnic areas to the heart, the lungs, the limbs, and the central nervous system; for calling forth stored carbohydrate from the liver; for abolishing muscular fatigue; for rendering the blood more readily coagulable and increasing its oxygen carrying power; and even for the dilatation of the bronchial tree which allows greater ventilation of the lungs. The importance of such physiological changes in times of stress is quite obvious. By experimental ablation of various portions of the brain the author has demonstrated that this mechanism is not a function of the cerebral cortex but of the mid-brain. In other words it is a reflex process.

Subsequent chapters deal with the nature of hunger and thirst. The pangs of hunger result from powerful contractions of the empty stomach. With the lowering of the water content of the body the salivary glands fail to pour out their watery secretion in sufficient amount to keep the mouth moist. Hunger then results from nervous impulses arising in the stomach while thirst is dependent first upon general then local dehydration.

The author sees in increased adrenin secretion in times of stress, and in the sensations of hunger and thirst, powerful primitive reflex phenomena utterly beyond volitional control, acting for the preservation of the organism. As a result of the adrenin mechanism

the individual in the face of fear or anger is enabled to run faster, to endure longer, and to fight harder. Haemorrhage is rapidly arrested, and oxygen is supplied to, and waste products eliminated from the tissues at a more rapid rate.

The book makes delightful reading for the physician as well as for the physiologist, because the author has presented briefly such simple experiments as are necessary to provide a foundation of facts upon which to lay his enticing deductions. A great mass of isolated experimental evidence has been brought together and woven into a concise and convincing explanation of the fundamental physiological reactions acting for the preservation of the species.

E. S. MILLS

Principles of Chemistry: An Introductory Text-Book of Inorganic, Organic, and Physiological Chemistry for Nurses and Students of Home Economics and Applied Chemistry. With Laboratory Experiments. Joseph H. Roe, Ph.D., Professor of Chemistry, George Washington University Medical School. Second edition, 427 pages. Price \$2.50. Publishers: St. Louis, C. V. Mosby; Toronto, McAlpin & Co., 1929.

This book shows evidence of careful writing. The student carries from chapter to chapter a very clear conception of the information the author is seeking to impart. The definitions have scientific lucidity, and yet are not too technical for easy comprehension by the average student. The twenty-eight chapters contain a very concise account of the physical, chemical, and physiological properties of the elements constituting the science of chemistry, together with long list of experiments, clearly defined. Illustrations, charts, etc., are included, making this book very instructive and interesting to nurses and to anyone dealing with chemistry.

JOHN HUNTER

The Life of Hermann M. Biggs, M.D., D.Sc., LL.D. C. E. A. Winslow, Dr.P.H. 432 pages, illustrated. Price \$5.00 net. Lea & Febiger, Philadelphia, 1929.

In this delightfully written and most readable biography Dr. Winslow has unfolded much of the story of the development of modern preventive medicine. We are told the story of Dr. Biggs' childhood days, the influences surrounding him as a youth and as a student leading up to his graduation in medicine. While beginning the practice of medicine he carried on clinical duties in various hospitals and directed a pathological laboratory, in addition to the duties of an instructor in his medical college. From 1881 to the time of his death in 1923 he had been continuously connected with his university and Bellevue Medical College as student, teacher, member of Council, and, finally, Professor of Medicine. Rarely has the world of medicine seen a man with such a combination of talents as the basis of a great life's work. A distinguished teacher in medicine, he was outstanding in his mastery of clinical diagnosis, and became one of the country's most skilled consultants in medicine. Trained in Welch's laboratory, with laboratory study abroad in pathology and the new science of bacteriology, he was in a position with his remarkable executive ability, to develop the health laboratories of New York City and State into such a commanding position that, with the Department of Health, they practically led the world in municipal health work. Scientific medicine based upon laboratory and clinical investigation formed the basis of his work in the new science of preventive medicine, and this was his great life work.

The older physician will read this biography with pleasure, the student and young physician will find it a stimulus to work. What was accomplished by one man of frail constitution can scarcely fail to arouse a desire to achieve some similar object. As a student and

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throughout his life his master words would appear to have been "work" and "service." When he began the study of medicine he is said to have expressed himself in the words, "We Biggs are not a long lived race. If I want to do something in the world I can't afford to lose any time."

Dr. Winslow has told the story of the man who was amongst the first in America to demonstrate the tubercle bacillus, who traced typhoid epidemics to their source, who isolated "Typhoid Mary", who first produced and distributed free diphtheria antitoxin, who first organized a national anti-tuberculosis program with compulsory notification, who founded the first municipal sanatorium, who was the first to point out the need for trained sanitary leaders, the first to organize a fully equipped municipal health department, and who stimulated the growth of public health throughout the world.

Having brought all the infectious diseases into the realm of preventive medicine, he was one of the men principally responsible for pointing out that the degenerative diseases of middle and later life would form the outstanding health problem of the future. He helped to pave the way for the present movement for whole-hearted co-operation between health authorities and private practitioners, and for the education of the public in health matters. When he began his work public health was concerned only with a few acute communicable diseases. It was in the hands of a few untrained officials. He left it a solid applied science, in the hands principally of well trained men, who have behind them a steadily increasing weight of public opinion.

J. H. ELLIOTT

Biological Reversion and Hippocratic Anatomy.

Hubert Higgins, M.A., M.R.C.S., L.R.C.P. 149 pages, illustrated. Price 7/6. H. K. Lewis & Co. Ltd., London, 1929.

This is the most incomprehensible work that has fallen to our lot to review. First, and most important, no definition of biological reversion, or even of Hippocratic anatomy, is provided for the reader, who therefore cannot be expected to understand what it is all about.

It is only necessary to quote a few sentences from the book. Preface, page 5.—"If there had been no Hippocratic anatomy, it would have had to be invented for the purposes of biological reversion." Page 60.—"Integral research must provide, to be successful, a sequence of anatomical analysis proceeding from diagnosis to complete biological reversion".

Page 63.—"The toxin, rude chemical elements, comparable to lead or arsenic, enters quietly like a bad fairy in a drama into the arena, or it departs without any mysticism, untainted with even the aroma of personality." Page 112.—"The simple, illuminating and practical abstraction of cells and lymph is invaluable in both diagnosis and therapy."

It is useless to continue—only Christian Science can supply us with an "abstraction" as difficult to understand as this.

L. J. AUSTIN

From the Seen to the Unseen. John H. Best, B.Sc. 552 pages, illustrated. Price \$7.00. Longmans, Green & Co., Toronto, 1929.

As the cover of this book announces, it is an attempt to prove that a consideration of all known scientific facts leads one inevitably to the conception that a thinking, purposive Being is behind the Universe, not only as its director now but as its originator. To this end are discussed many scientific facts in what is a thoroughly readable manner and in terms that are well explained from the standpoint of the non-scientifically trained reader.

Each chapter is well worked out, but the plan of the entire book is rather confusing. The physical properties of life, with a classification of all members of the animal kingdom, accompanied by a more detailed account of the distinguishing features of each of the great classes, are first given; next, a description of the chemical constitution of matter, and then is added a rather detailed account of digestion, respiration, circulation, as they occur in the human being, and a very lengthy discussion of the nervous mechanism of the body. From that we are taken back to discuss cells and tissues, then mitosis and the development of the individual. Amphioxus, fish, and chick, are all taken up, some sketchily, some more fully. Next some of the theories concerned with the generalizations of biology are discussed, such as the theories of Weissmann, and the laws of Mendel. Throughout the discussion it is constantly pointed out how beautifully each structure is adapted to its particular function and how one is forced more and more to the conclusion that mere chance in the course of evolution could not have determined this or that arrangement, but that there must have been a purposive mind with the end in view, directing the course of development so that every structure was made according to the pattern most conducive to securing the desired result. The latter point is not stressed in the earlier chapters, its fuller discussion being left to the later ones, in which treatises on psychology, evolution, astronomy, and ethics are given. The conclusion reached is that we can understand the Universe and its manifold variations only as the product of a Supreme Intelligence.

What the author of this book fails to realize is that there may have been many forms of life originated by the process of evolution which, being inadequate, failed to survive, so that it was only those possessing a structure adapted to the desired function that were left. That such is the case is obvious even to one with the ordinary medical knowledge, there being many infants born in whom the purposive character of the developmental process is lost. Born without eyes, without brain, without arms or legs, with a heart that is incapable of functioning, with a digestive system that is a blind tube, with a bile duct that is impervious, with deformed and useless limbs, they fail to impress one with regard to the Supreme Intelligence that directed the course of their development; the perfect adaptation of form to function that betokens a purposive Being behind it all is obviously lacking in their case. These misfits, with which one has to reckon, somehow spoil the argument.

To sum up the book briefly; it is a readable account of a great many scientific facts, but is incomplete in each of its sections, so that the lay reader does not gain an adequate knowledge of physiology, anatomy, genetics, astronomy, or any other branch of science which is discussed. From the standpoint of the purpose it was intended to fulfil, namely, to prove that one is led to a conception of God because of the inadequacy of the known facts of science in supplying an explanation of the universe, it contains so much irrelevant material that the reader is lost among the mass of facts. Finally, even though the book lacked these faults, one still would question the use of it. We cannot demonstrate God as we can a theorem, leading up to the conclusion step by step and adding a final Q. E. D. Belief in God must be now, as it ever was, a matter of faith, a spiritual attitude of the individual, which is not attained through any process of reasoning.

MADGE T. MACKLIN